THE IRON TRADE REVIEW

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Contracting is Conservative

Usually Confined to First Quarter in Finished Materials—Price Concessions Continue—Fair Pig Iron Buying

Pig iron buying in some parts of the country, particularly in Chicago and Philadelphia, continues in considerable volume, but transactions throughout the country do not make the large aggregate of recent weeks. This is to be expected, after the heavy buying movement, and it is not probable that many orders will be placed until after the holidays. In the Philadelphia district, low phosphorus iron has figured conspicuously. Recent purchases made by the United States Cast Iron Pipe & Foundry Co. have been heavier than announcements indicated and the company is still figuring on northern and southern grades. In the south, $9.50, for No. 2 Birmingham, is now the ruling quotation.

Railroad Buying

The Illinois Steel Co. took the recent order for 1,500 tons of bars for the Chesapeake & Ohio railroad. The Pere Marquette has asked for 5,500 tons of rails. The Pennsylvania railroad has specified on 5,000 tons of rails to be rolled by the Pennsylvania Steel Co. The Norwegian order for 27,000 tons will, it is expected, be placed in a few days. The Pennsylvania will soon place orders for the plates necessary for 1,050 steel box cars, which are to be built at the Altoona shops of the company. The Pennsylvania has done nothing on rails or cars for 1915.

Machinery

The eastern machinery market is enjoying a very encouraging increase in demand from domestic buyers. A Massillon, O., company is in the market for machine tool equipment to the value of $25,000. Demand from abroad continues and there is active inquiry from France, Russia and England. In the foreign business placed during the past week were a considerable number of lathes for export to France and England. Machine tool business in Pittsburgh is improving and there are also better prospects for heavy machinery. Orders for lathes and radial drills are being received in large numbers at Cincinnati, principally from foreign countries.

Finished Material

In finished materials the Steel Corporation and some other companies report a gratifying increase in bookings since Dec. 1. Business is being done in a conservative way, with no disposition to indulge in speculative transactions. Many mills are showing an increasing disposition to disregard the Pittsburgh base and are more freely quoting prices which, if figured back to a Pittsburgh base, would be extremely low. On plates, shapes and bars in desirable tonnages, no difficulty is experienced in placing orders at 1.05c, Pittsburgh, for delivery up to April 1. Competition in fabricating and erecting structural steel is very keen and the taking by mills of some contracts which ordinarily go to fabricating shops has caused considerable stir. Sellers of steel bars are more aggressive in the east in naming low prices for prompt delivery. Prices on steel bars are also very low at Chicago.

Coke and Scrap

The Youngstown Sheet & Tube Co. has contracted for its requirements for coke for next year. When fully employed, it consumes about 60,000 tons per month. A considerable tonnage has been contracted for by other blast furnace operators. The recent activity in scrap has subsided, but dealers in Chicago are still advancing quotations.

THE OPEN HEARTH

The Engineer and Publicity

THE paper presented at the recent meeting of the American Society of Mechanical Engineers under the above caption, by C. E. Drayer, treats a subject which has received too little attention from the engineering profession. While the relations of engineers to trade papers has been well established on pretty definite lines, the same cannot be said concerning the popular newspapers and magazines.

Mr. Drayer points out that the public is deeply interested in things which engineers are doing and is glad to know about advance in science, and also about the men who make the progress possible. He also points out that engineers have an opportunity and duty to render service to the public by giving it dependable information about technical subjects. The failure of newspapers generally to give more attention to engineering subjects is due to the fact that very few newspaper reporters have the technical knowledge necessary in order to handle accurately articles relating to engineering subjects. Mr. Drayer points out this fact when he says that the ordinary newspaper uses the same reporter to write crimes, politics, sport, investigation and technical achievement, and he might have added that the average engineer is more ignorant in regard to news writing than is the reporter about engineering topics. The difficulty is to find engineers with any appreciation of news values and with even fair ability to write what the newspaper men call a live story. That there are, however, exceptions to this rule has been demonstrated by Mr. Drayer and a few others, who have done admirable service in giving the people of different localities some idea of what engineers are doing.

If engineers and engineering societies wait until the newspapers come to them, there will never be much published in the newspapers about engineering subjects. This is particularly true in large cities where the demand for space for all sorts of news is so pressing that only the matters generally regarded by editors as most important receive attention. In other words, the engineering society must do its own press work by preparing readable articles, of not too great length, which will be of general interest. Newspapers are willing to do their part, if engineers will serve them in a way which will be acceptable to the general reader.

If "our program of legislation with regard to the regulation of business is now virtually complete," it would be a good idea for the President to chloroform certain new recommendations for legislation made by Attorney General Gregory and others. Let the dose be a big one, so that the slumber will be more than a twilight sleep.

Not Mystery But Unanswerable Argument

IN HIS annual report, Secretary of the Navy Daniels renews the agitation in favor of the government building its own armor plate plant. "Twice the government has authorized the construction of a factory," he asserts, "but twice were the armor plate factories saved a monopoly of this business through a 'mysterious Providence'."

As a matter of fact, there was no mystery about it. If the secretary will take the trouble to investigate, he will find the various projects to build armor plate plants were abandoned in accordance with the dictates of sound common sense. The arguments against the project were unanswerable. Repeated investigations demonstrated that it would be folly for the government to undertake a project of this kind. For example, in 1897, an armory factory board was created by authority of an act of congress and extended investigation was made. In accordance with detailed instructions given by Theodore Roosevelt, then acting secretary of the navy, the late John Fritz was paid $15,000 for services as an expert and a very elaborate report containing detailed drawings of the proposed plant was published. The most important part of this report was the discussion as to the practicability of the government going into the armor plate making business. Unanimous conclusions of the members of the factory board were as follows:

"1. An armor factory comprises essentially

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a collection of special furnaces, heavy machine tools and appliances that are not needed in any other class of work, and a class of labor especially skilled in the business.

"2. A government armor factory not connected with an establishment engaged in other branches of the steel industry would depend for its success and economic administration upon a constant demand for an output nearly approaching its full capacity.

"3. If the government should establish an armor factory the efficient and economic maintenance or working of that factory would necessarily depend upon a constant yearly appropriation for ships to be provided with armor, because the armor produced at any time must be specially designed for and fitted to those ships. Any failure to appropriate for such ships in any one year would require the cessation of work and the laying-off, indefinitely, of the skilled experts and laborers that had been trained to this industry. A resumption of work at a later period would require the training, at a considerable expense, of a new set of men. In the meantime, the progress of the art would perhaps have been such that difficult and radical changes would be required, which under continuous working might have been gradually and easily made."

In the face of the above statements, hinting very mildly at the tremendous annual expenditures which would be necessary to maintain an armor plate plant at a reasonable degree of efficiency, it is difficult to imagine why the secretary of the navy continues to advocate this government plant project, unless he is doing it for purely partisan reasons or self-glorification.

The secretary expresses regret that the commission recently named by congress cannot, on account of the war in Europe, make an examination into the production of armor plate abroad. It would indeed be an inspiring spectacle for the world to see representatives of the only great nation at peace traipsing about in Europe trying to find out how armor plate is made!

If there ever was an appropriate time for agitating this armor plate project, that time certainly is not today. "We are the champions of peace and concord," President Wilson said in his recent message to congress. "And we should be very jealous of this distinction which we have sought to earn. Just now we should be particularly jealous of it, because it is our dearest present hope that this character and reputation may presently, in God's providence, bring us an opportunity such as has seldom been vouchsafed any nation, the opportunity to counsel and obtain peace in the world and reconciliation and a healing settlement of many a matter that has cooled and interrupted the friendship of nations."

Would the making of plans for the building of an armor plate plant give evidence of our sincerity in our professions of peace?

It seems to be a case of more watchful waiting in Colorado. 'Twould be well to be extremely watchful concerning some of the labor agitators in that state.

The Best Gift

THE best Christmas gift which manufacturers can give men this year is an opportunity to work. In the language of Edmund Vance Cooke:

Not enough, not enough is the charity dole
Which suffices the stomach and empties the soul.
Not enough, not enough are the fatuous laws
Which solace the soreness, while leaving the cause.
Not enough, not enough is the festival cheer
Bringing good will to men for one day in the year.
But if, the year through, we might struggle to give
Instead of to get—ah, well, THEN we might live!
So what is the Gift we are giving the World?

Even if many must be reduced in wages and given less work, let as many as possible be given some work.

Increase the number of members of the Interstate Commerce Commission, if necessary. Surely the country would like more prompt action from that body. But why mix up the proposed increase question with the Rayburn bill to regulate railroad securities? Let the latter stand on its own merit, if it has any.

If legislators were as wise as the governors of the New York Stock Exchange and knew as much about business conditions, the laws would provide for genuine regulation of stock exchanges.

Prices Present and Past

Quotations on leading products today, average for last month, average for three months ago and average for December 1913. Prices are those ruling in the largest percentage of sales at the dates named.

	Today's prices.	Average for Nov., 1914.	Average for Sept., 1914.	Average for Dec., 1913.
Bessemer pig iron, Pittsburgh..	$14.70	$14.70	$14.90	$15.90
Basic pig iron, Pittsburgh.....	13.45	13.45	13.90	13.71
No. 2 Fdy. pig iron, Pittsburgh	13.70	13.70	13.80	14.36
Northern No. 2 Fdy., Chgo....	13.00	13.00	13.50	14.50
Lake Superior Charcoal, Chgo..	15.75	15.75	15.75	15.50
Malleable, Bessemer, Chicago...	13.00	13.00	13.50	14.50
Southern No. 2, Birmingham...	9.50	10.00	10.00	10.75
Southern Ohio No. 2, Ironton..	12.75	13.00	13.00	13.50
Basic, eastern Pa.....	13.50	13.50	14.00	14.25
No. 2X Virginia furnace.....	12.50	12.50	12.50	12.75
No. 2X Foundry, Philadelphia..	14.25	14.25	14.75	15.00
Ferro mang., Balti.....	68.00	68.00	80.00	47.00
Billets, Pbgh.	19.00	19.00	21.00	20.00
Sheet bars, Pbgh.....	19.50	19.62	22.00	21.00
Steel bars, Chicago.....	1.19	1.25	1.38	1.38
Steel bars, Pittsburgh.....	1.05	1.10	1.20	1.31
Iron bars, Philadelphia.....	1.15	1.15	1.17	1.27
Iron bars, Cleveland, local del'y.	1.15	1.20	1.20	1.30
Iron bars, Chgo. mill.....	.95	.975	1.07	1.15

	Today's prices.	Average for Nov., 1914.	Average for Sept., 1914.	Average for Dec., 1913.
Beams, Chicago	$1.19	$1.25	$1.38	$1.38
Beams, Pittsburgh	1.05	1.11	1.20	1.25
Beams, Philadelphia	1.25	1.25	1.30	1.35
Tank plates, Pittsburgh.....	1.05	1.09	1.18	1.18
Tank plates, Chicago.....	1.19	1.25	1.38	1.33
Tank plates, Philadelphia.....	1.25	1.25	1.30	1.40
Sheets, blk., No. 28, Pittsburgh	1.80	1.89	1.95	1.88
Sheets, blue an., No. 10, Pbgh.	1.35	1.39	1.40	1.40
Sheets, galv., No. 28, Pbgh....	2.80	2.86	2.95	2.87
Wire nails, Pittsburgh.....	1.50	1.59	1.55	1.55
Connellsville fur. coke contr....	1.70	1.65	1.75	1.81
Connellsville fdy. coke, contr...	2.25	2.25	2.35	2.54
Heavy melting steel, Pbgh.....	10.25	10.06	11.44	11.00
Heavy melting steel, east'n Pa.	9.50	9.50	10.50	10.00
Heavy melting steel, Chgo.....	8.00	8.25	9.37	9.00
No. 1 wrought eastern Pa.....	11.50	11.00	12.50	13.00
No. 1 wrought, Chgo.....	7.75	7.50	8.31	8.50
Rerolling rails, Chgo.....	9.50	9.50	10.87	11.50
Car wheels, Chgo.....	10.00	10.00	10.75	12.25

(For Additional Prices See Page 1154.)

Lull Comes in Pig Iron Buying

Natural Decrease in Volume After Recent Activity, But Still Good Amount of Business in Some Centers—Prices Generally Firm

Philadelphia, Dec. 14.—Covering by buyers for first quarter, for first half and in the case of low phosphorus iron, for all year delivery, is keeping up in this territory. Low phosphorus iron has continued to command a leading position in this activity, and sales of this grade in the week have reached about 10,000 tons. The Midvale Steel Co., late in the week, bought 3,000 tons for first half from an eastern Pennsylvania maker. Another eastern buyer closed for 2,300 tons from a Lebanon furnace, which sold 1,500 to 2,000 tons additional. Other sales of both standard and Lebanon brands were made in the week. An eastern consumer recently took 7,500 tons of standard low phosphorus for all year delivery and this was included in sales reported a week ago. Prices continue at about $19 to $20, Philadelphia, for standard and at $16 to $16.50, furnace, for Lebanon grades. Further light cast upon recent quiet basic sales in eastern Pennsylvania by a steel works in this district, shows these totaled 12,000 to 15,000 tons. The prices at which this business was done are indefinite, both $13.25 and $13.50, delivered, being reported. It is thought the actual price was between these two figures. Little is being done in basic at present. There is a fair run of foundry business, though this is not so generally active as a week ago. A radiator manufacturer asks 1,000 tons; a Royersford, Pa., stove maker has deferred action on 600 tons; a Norristown buyer recently placed about 1,500 tons and numerous smaller lots are being closed. Some cast iron pipe makers still are buying. The United States Cast Iron Pipe & Foundry Co.'s recent purchases of northern and southern iron have totaled a round tonnage, but this buyer still is in the market. It is understood to have placed 5,000 to 10,000 tons for its local plant and to have obtained northern forge at around $13.25, delivered. Two other eastern Pennsylvania pipe shops are in the market. A Lynchburg, Va., pipe foundry, which was reported a buyer a week ago, is reported to have closed for 10,000 tons of Alabama iron in all, and now inquires for 1,000 tons of forge and No. 3. For northern No. 2X foundry, $14.25 to $14.50, Philadelphia, continues to be named. Virginia No. 2X remains at $12.50 to $12.75, furnace. Virginia iron continues to move more actively and the Oriskany and one other furnace there are planning to go in soon. The latter will be the replacement of a stack now active. The reports of the Eastern Pig Iron Association for November showed an increase in unfilled orders and a small gain in stocks.

Pig Iron Quiet After Heavy Selling

Pittsburgh, Dec. 15.—The pig iron market in western Pennsylvania and eastern Ohio is quiet, after a period of activity which extended over three weeks, during which approximately 100,000 tons were sold. Scattering inquiries for small lots of foundry grades have come out the last few days, but, with more important melters under cover, blast furnace managers do not expect to witness activity until after Jan. 1. Despite heavy selling, prices have not changed much in position. Leading valley manufacturers are asking $13 to $13.50, furnace, for No. 2 foundry, but this grade still is obtainable from nearby stacks on the basis of $13.70, Pittsburgh. Steel-making grades remain quiet; basic is being held at $12.50 and Bessemer at $13.75, valley. Gray forge, from nearby furnaces, is obtainable at $12.50, valley.

Market Quiet Again

Cincinnati, Dec. 14.—The pig iron market is quiet again and it is expected by the trade here that it will remain so until after the first of the

(*For complete prices see page* 1154.)

year, as buyers in most cases are taking stock or have postponed negotiations until January. No important sales have been made during the past week and inquiries before the general market are for small tonnages. Business is being secured mostly through solicitation by salesmen, and, taken as a whole, the situation has dropped back to the same quiet state that it experienced throughout the entire year until late in November, at which latter time a good buying movement developed.

Prices are in accordance with conditions and are unchanged and will probably remain so until some time during the first quarter. Southern No. 2 foundry is quoted at from $9.50 to $10, Birmingham basis, but iron available at $9.50 is very limited and general quotations are from $9.75 to $10, Birmingham basis, for this grade. Southern Ohio No. 2 foundry iron is stationary at $12.75, Ironton basis.

Fair Buying at St. Louis

St. Louis, Dec. 16. (By wire.)—A fairer amount of pig iron buying has taken place in the last few days in which southern grades figure largely. One lot of southern iron sold involved 10,000 tons and another lot was for 5,000 tons. A local malleable foundry has taken 2,000 tons of malleable, while another foundry has bought 2,000 tons of northern foundry iron. An inquiry now out in this market calls for 1,100 tons of both northern and southern iron.

Iron Buying is Continued

Chicago, Dec. 15.—Continued encouragement is coming to sellers of pig iron in this district from the steadiness with which inquiry and resulting sales are maintained. Apparently the market has arranged itself in more or less regular grades and most of the larger users appear to have satisfied their requirements while at present inquiries and sales are from those taking from a carload to 500 tons at a time. Sales of these small sizes are being made steadily by all interests. It is noted that melters, for the most part, are taking considerably less iron than usual for first quarter and first half requirements and the spirit of conservatism apparently marks all their transactions.

Buyers are taking iron more readily than usual in December when experience is that many requests are received to hold back shipments. Shipments thus far in December on the part of some makers have been much larger than for any month since the middle of the year. Reserve stocks on furnace yards in some instances are being reduced materially, which adds an element of strength to the market. One seller was somewhat startled a few days ago by receiving a request from a melter that his entire contract for first quarter be shipped before the first of the year, if possible.

Dullness continues in the malleable iron field and a number of foundries ordinarily working entirely in malleable have obtained gray iron contracts and are keeping up to some degree of activity on this sort of work.

Activity of inquiry for southern iron continues and considerable sales are being made steadily, prices ranging from $9.50 to $10, Birmingham, according to analysis and brand. Considerable juggling of analysis apparently is taking place in an effort to protect the apparent quotation on No. 2 foundry.

Lull at Cleveland

Cleveland, Dec. 15.—A decided lull has come in the pig iron market in the Cleveland district, but this was expected and is not regarded as an unfavorable development. The melt is being well maintained and shipments are going forward satisfactorily on contracts. Prices are firm.

Union Drawn Steel Warehouse

The Union Drawn Steel Co., which has two mills at Beaver Falls, Pa., and is a large producer of bright finished steel, has established a warehouse at Nos. 19 to 23 St. Aubin avenue, Detroit, under the management of Walter J. Bothwell as district sales manager. This warehouse will carry a large and complete assortment of sizes of shafting, screw steel, axle steel—both nickel and open-hearth, as well as case hardening steels, and elevator guides.

The company first erected warehouses in New York City, Philadelphia and Chicago, later established one in Cincinnati, and now has opened this one in Detroit, making five warehouses, which are supported by a large stock at the mills in Beaver Falls. Mr. Bothwell will be assisted by Fred W. Walters and John Andrews, both well known salesmen in the steel trade.

The Franklin Sheet Metal Works, Franklin, Pa., recently established by F. J. Pickard, will engage in the manufacture of iron fence, stove and conductor pipe and other specialties. Part of the equipment has been installed, including a 10-foot conductor pipe corrugating and seaming machine built by the Canton Foundry & Machine Co., Canton, O.

(*For complete prices see page* 1154.)

Good Increase

In New Business Reported by Leading Companies

New York, Dec. 16. (By wire.)—Large steel makers including the United States Steel Corporation report an appreciable increase in bookings of various lines since Dec. 1. In some cases, tonnage taken has exceeded the same period a year ago. Some large sales offices in this city state that tonnage entered the past week has compared with old times and reaches a large total.

Apparently the low prices now offered for early delivery are stimulating buying.

Carefully compiled statistics show that the total stocks iron in the country at the present are approximately 1,900,000 tons. Stocks in the south are heavy.

Dismantling Tidewater Plant

The plant formerly operated by the old Tidewater Steel Co. at Front and Wilson streets, Chester, Pa., exclusive of the blast furnace, has been sold to the Richard De Cou Co., Philadelphia, and is being dismantled. A part of the equipment is being repaired and offered for sale for further use, but the greater part is being scrapped, together with the structurals.

This plant was first operated in the manufacture of sheets and tubes by the Chester Rolling Mill Co. in 1875. Later, it passed into other hands and then to the Tidewater Steel Co. It has not been operated for about ten years. The furnace is being operated by the Delaware River Steel Co.

Inspected Plants

Edward E. McCall, chairman; Alfred Craven, chief engineer; Travis H. Witney, secretary; LeRoy Harkness, assistant counsel; Robert Ridgway, engineer of subway construction, and George L. Lucas, engineer in charge of the materials inspection division of the commission in charge of the building of the new subways and elevated systems of New York City, inspected plants in the Pittsburgh district last week. They visited mills furnishing material for New York project, undertaken by the Public Service Commission, the Interborough Rapid Transit Co. and the New York Municipal Railway Corporation.

Still Shading on Sheets

Many Mills Disregard the Pittsburgh Base and Concessions Are Rather Freely Made

Pittsburgh, Dec. 15.—Consumers of steel sheet products generally are covering first quarter needs on the basis of published quotations, although some mills are shading those figures for immediate delivery. Freight differentials are being waived in many cases by mills having advantage of lower freight rates. Specifications against contracts show more snap than previously, but buyers, as a general rule, do not want material shipped until after the end of the year. Material for shrapnel, for shipment to belligerent nations, probably will be packed in steel sheet cases, and fairly heavy tonnages of sheets will be required for these containers.

Dull Market in East.

Philadelphia, Dec. 14.—There is no break in the hand to mouth buying of sheets which recently has prevailed in the eastern market. As the first quarter approaches, there is a little more interest in contracts and some of this business is being closed at prevailing prices. Specifications, however, do not change appreciably and mill operations are light. Prices continue around 1.45c, Philadelphia, or 1.30c, Pittsburgh, for No. 10 gage and this figure occasionally is shaded.

Sheets Weaker

Cincinnati, Dec. 14.—The sheet market is weaker and business has dropped off a little during the past week, principally because of inclement weather and the fact that dealers are taking stock and will not make any further purchases until after the first of the year. Prices have dropped $1 a ton and are now quoted at 2.008c for black sheets No. 28 gage and 3.008c for galvanized No. 28 gage, both Cincinnati basis.

Weak at Cleveland

Cleveland, Dec. 15.—The sheet market continues weak, the usual quotations being 1.80c on No. 28 black, 2.80c on No. 28 galvanized and 1.35c on No. 10 blue annealed. Some contracting is being done through the first quarter.

Sheets Take a Slump

Chicago, Dec. 15.—Steel sheets, both black and galvanized, have taken a decided slump in the past week. For prompt shipment galvanized may be obtained at 2.89c to 2.94c, Chicago mill, for No. 28 gage and black sheets of the same weight are available at 1.99c to 2.04c, Chicago mill.

With only two weeks remaining of the present quarter, these prices are without particular significance except that they indicate the need of mills for additional prompt tonnage. For first quarter, No. 28 gage black sheets are being quoted at 2.04c to 2.09c and galvanized at 2.94c to 2.99c, Chicago mill. Makers are coming into the new year with comparatively small bookings and prices are without strength, the future holding little promise for better things.

Buys Furnace Coke

Youngstown Sheet & Tube Co. Contracts for Requirements for Year at Flat Price—Other Consumers Buy

Pittsburgh, Dec. 15.—The Youngstown Sheet & Tube Co. last week covered blast furnace coke requirements for 1915. While no definite announcement has been made, it is generally understood the Youngstown concern placed contracts with a couple of prominent Connellsville district operators, at a flat price, said to be in line with current quotations. When operating at capacity, the Youngstown Sheet & Tube Co. consumes 60,000 tons of coke a month. The company now is operating two of its four blast furnaces, but probably will apply the torch to another stack early in the year. Sales of Connellsville coke the last three weeks for shipment over periods extending from six months to two years, involve fully 125,000 tons a month, most of which was obtained on sliding scale contracts. Other consumers this week have closed for 25,000 tons a month. Operators having fairly heavy back log tonnages, are asking advanced prices for fuel, numerous offers of $1.75, ovens, having been refused. The foundry coke market is unchanged in position. The Connellsville *Courier*, for the week ending Dec. 5, says production in the upper and lower Connellsville regions was 195,575 tons, an increase of 16,136 tons compared with the week before.

Inquiry Unclosed

Cincinnati, Dec. 14.—The inquiry for 15,000 tons of furnace coke from a Jackson, O., furnace, for shipment over the first half, is still unclosed, although several dealers here have bid upon this business during the past week. This is the only inquiry of importance before the market, as only a few furnaces are in blast in southern Ohio, and fully 90 per cent of foundries in this territory have covered for requirements well into the second quarter. Shipments on old contracts are good and the consumption, especially that of foundry coke, is good. Prices are unchanged on all grades of southern coke.

More Sales in East.

Philadelphia, Dec. 14.—A Lehigh Valley furnace has closed for 5,000 to 10,000 tons of 48-hour Connellsville coke for first half delivery. A Schuylkill Valley consumer still figures on about 15,000 tons monthly for first half. Prices on standard Connellsville coke quoted in the east show firmness at $1.75, ovens, for first half. A recent all year contract for 80,000 tons, by an eastern furnace previously reported, now is understood to have gone to a leading operator at $1.85, ovens.

(*For complete prices see page* 1154.)

Warehouse Business Steady

Chicago, Dec. 15.—Warehouses find business continuing at about the same volume, but with the holiday season practically here, no increase is looked for until the first of the year.

Prices remain steady at existing levels, not sufficient tonnage being competitive to cause reductions, although mill prices have sagged considerably below the level at which present warehouse prices were established.

Market Fluctuates

Cincinnati, Dec. 14.—Warehouse business continues to fluctuate, being good one day and poor the next, but the aggregate from week to week is about the same. Demand for twisted concrete re-inforcing bars has dropped off this week because the cold weather has temporarily checked building operations where concrete is used. Aside from this, sales are about evenly distributed among different materials carried by local houses. Prices are a little unsteady, but dealers here have decided not to consider any change until after the first of the year.

Active Bar Selling

By Eastern Interests at Low Prices for Prompt Delivery—Railroad Business Pending

Philadelphia, Dec. 14.—More aggressiveness to sell steel bars for immediate specification at 1.05c, Pittsburgh, or 1.20c, Philadelphia, became apparent the past week in this territory. This figure now more openly represents the market. There are some reports even that first quarter business has been solicited at this basis, but sellers deny this and no instances of such selling have been verified. The contract market for first quarter, however, bids fair to be defined shortly as a number of consumers now are inquiring for their needs for such a period or beyond. The Baltimore & Ohio railroad is one of these and the Norfolk & Western still figures on 1,000 tons. It is stated that the recent contract for 1,500 tons for the Chesapeake & Ohio railroad went to the Illinois Steel Co. The Pennsylvania railroad has been placing some larger bar orders for quick delivery.

Steel Bars Are Weak

Chicago, Dec. 15.—Comparatively little business is being done in this market in steel bars and other finished steel products and prices have sagged somewhat recently. Quotations of 1.24c, Chicago mill, are general and in order to obtain tonnage, some interests are offering their output at $1.00 per ton lower, but even this level of prices is not resulting in an increase of orders.

Some improvement in specifications for immediate shipment on existing contracts has been noted recently, but the expectation is not held that any considerable improvement will be made until after the first of the year when inventory will be completed and the new year's business put under way.

Iron Bars Stationary

Chicago, Dec. 15.—No essential change has taken place in the situation as to bar iron in the Chicago district and quotations are still 0.95c to 1.00c, Chicago mill. Although tonnages continue to be sold at $1 per ton less than this minimum, the claim is made that low priced iron is not as plentiful as was the case ten days ago and some makers claim they are not quoting anything below 1.00c, Chicago mill.

This advance of the minimum quotation on the part of some makers is dictated by the higher price being asked for rolling mill grades of scrap. As a matter of fact, makers claim that bar iron has been selling much too low in proportion to the cost of scrap for some time past and any advance in the latter must be reflected in quotations on the former.

Foreign Bar Inquiry Received

Pittsburgh, Dec. 15.—J. Rogers Flannery, president of the Flannery Bolt Co., this city, who is representing the Pittsburgh Foreign Trades Commission in England, has sent makers in this district an inquiry for 8,000 tons of steel bars for export. Particulars of the transaction have not become public. Steel bars, like plates and shapes, are being offered at 1.05c for prompt shipment, but 1.10c and above is being asked for delivery after Jan. 1. Makers of hot rolled products are operating plants at about 40 per cent of capacity.

Conservative Contracting

Cleveland, Dec. 15.—There is some contracting up to April 1, but consumers are not disposed to take on large tonnages. This is an indication that the speculative feature is not present in the market and that consumers are merely trying to contract for their actual requirements during the next few months. On desirable business, 1.05c, Pittsburgh, is the prevailing quotation.

Puddling Furnaces Started.

Philadelphia, Dec. 14.—The Glasgow Iron Works, Pottstown, Pa., has started seven puddling furnaces to build up stocks which have become low. It is expected that these furnaces will be active only temporarily, as there is no improvement in iron mill trade. Bar iron continues slow at 1.12c to 1.15c, Philadelphia.

Hoops, Bands, Shafting

Pittsburgh, Dec. 15.—Makers of hoops and bands continue to experience dull conditions. While inquiries for first quarter delivery are fairly satisfactory, yet there is no buying of consequence and prices are unattractive. Cold rolled shafting shows no snap, and prices are unchanged.

By reason of increased orders, the Badger Malleable & Mfg. Co., South Milwaukee, has increased its force considerably and is now operating at about 80 per cent of normal capacity, with prospects for full operation by Jan. 1.

Store rooms of Thompson & Co., Pittsburgh, manufacturers of Lino core oil, were damaged by fire last week. Operations of the plant were not affected.

(*For complete prices see page* 1154.)

Billet Inquiry

Comes from Scotland—High Freights Block Business

Philadelphia, Dec. 14.—A new inquiry for 2,000 to 3,000 tons of billets for Scotland came to eastern Pennsylvania makers the past week. Other foreign inquiries still appear.

Ocean freights at prohibitive figures continue to make interest in these inquiries for steel more or less perfunctory among eastern mills. Domestic consumers of billets in this district are inquiring more freely for prices on first quarter contracts which largely represent renewals of expiring contracts, and in a few cases have increased the tonnage called for. As a result, the contracting movement with eastern makers is a little more active. Specifications do not improve, however. For rolling billets, the market holds from $22.40 to $22.90, Philadelphia, or $19, Pittsburgh, and for forging steel about $3 to $4 higher.

Semi-Finished for First Quarter

Pittsburgh, Dec. 15.—Market observers differ considerably regarding the position of the market for billets and sheet bars. The Carnegie Steel Co., it is understood, is offering billets at a range from $19 to $20 and sheet bars from $20 to $21, mill, for first quarter delivery, and already has sold material at those figures. On the other hand, it is reliably reported billets can be obtained from $18.50 to $19, and sheet bars from $19 to $19.50, mill, for future delivery. Buying for shipment after Jan. 1 has not become general. Wire rods are being held at $25, Pittsburgh. Fairly heavy tonnages of wire rods continue to be sold for foreign delivery.

Wire Mills Avoid Contracts

Pittsburgh, Dec. 15.—The wire market shows no definite improvement. Material is freely offered on the basis of $1.50 a keg for nails, although manufacturers are avoiding contracts for extended delivery. Despite fairly satisfactory conditions enjoyed by wire makers, they have been unable to maintain prices above $1.50 for nails this year. Fairly heavy tonnages of barbed wire and wire rods continue to be sold for shipment to belligerent nations.

Iron Ore on the Docks

At Lake Erie Ports is Smallest Tonnage in Five Years Except One—The Receipts

Figures compiled by *The Marine Review* from the returns sent in by the various dock companies show that ore receipts at Lake Erie ports during the season of 1914 were 25,402,655 tons, out of a total movement by lake of 32,021,897 tons. Lake Erie docks on Dec. 1 held a balance of 9,345,871 tons, this being the smallest balance for the past five years with the exception of 1913, when 9,261,676 tons remained on dock. During 1913 the total shipment by lake was 49,070,478 tons, of which Lake Erie docks received 39,099,647 tons and held a balance on Dec. 1, 1913, of 9,261,676 tons.

During 1912 the total shipment by lake was 47,435,777 tons, of which Lake Erie docks received 37,472,108 tons, and held a balance on Dec. 1, 1912, of 10,080,798 tons. During 1911, the total shipment by lake was 32,130,411, of which Lake Erie docks received 25,531,550 tons and held a balance on Dec. 1, 1911, of 9,469,869 tons. During 1910, the total shipment by lake was 42,620,201 tons, of which Lake Erie docks received 34,042,897 tons and held a balance on Dec 1, 1910, of 9,797,980 tons. During 1909, the total shipment by lake was 41,683,873 tons, of which Lake Erie docks received 33,672,825 tons and held a balance on Dec. 1, 1909, of 9,471,428 tons. The reserve of 9,345,871 tons is more than will be needed for winter consumption. Never in the history of the trade have

IRON ORE ON LAKE ERIE DOCKS DEC. 1, GROSS TONS.

	1914.	1913.	1912.
Toledo	580,600	349,047	549,473
Sandusky	2,471	2,472	2,472
Huron	483,769	441,541	385,810
Lorain	1,486,063	694,704	904,343
Cleveland	1,757,543	1,930,720	1,888,560
Fairport	406,124	478,014	565,920
Ashtabula	2,749,315	3,202,807	3,350,553
Conneaut	1,160,639	1,248,032	1,429,533
Erie	484,467	594,613	661,330
Buffalo	234,880	319,726	340,261
	9,345,871	9,261,676	10,080,798

5,000,000 tons gone forward from dock to furnace during the winter season.

Shipments to furnaces between May 1 and Dec. 1, 1914, aggregate 21,976,941 tons, compared with 35,747,800 tons in 1913, 33,421,251 tons in 1912, 23,011,274 tons in 1911, 29,724,938 tons in 1910, 30,030,559 tons in 1909, and 17,254,782 tons in 1908.

The shipment to furnaces during the season of navigation, as referred to, are determined in this way: First, we have the amount of ore on Lake Erie docks as of May 1 last, 5,920,137 tons; add to this the receipts of the season just closed, 25,402,655 tons, the total is 31,322,812 tons; deduct the amount on dock Dec. 1, which is 9,345,871 tons, and we have 21,976,941 tons as the amount that was forward-

IRON ORE RECEIPTS AT LAKE ERIE PORTS, GROSS TONS.

	1914.	1913.	1912.
Toledo	773,711	1,084,215	1,411,278
Sandusky	.....	.....	.....
Huron	617,363	687,485	540,586
Lorain	1,677,988	3,709,213	3,771,350
Cleveland	5,519,698	8,812,583	7,914,836
Fairport	1,558,134	2,037,126	1,810,381
Ashtabula	5,318,788	8,336,126	8,158,080
Conneaut	6,263,480	7,849,303	7,839,831
Erie	260,991	713,904	547,067
Buffalo	2,913,273	5,506,691	5,060,642
Detroit	332,564	363,001	418,057
Pt. Colborne	166,665	.....	.....
Total	25,402,655	39,099,647	37,472,108

ed either direct or from dock to furnace yards.

It is understood, of course, that the difference between the total output of 32,021,897 tons shipped from the Lake Superior mines during 1914 and the receipts of 25,402,655 tons at Lake Erie ports is ore that went to places other than Lake Erie ports, such as furnaces at Lake Michigan ports.

The accompanying tables show receipts at Lake Erie ports and amounts on dock during the past three years.

Inquiry From Holland

Cleveland, Dec. 15.—An inquiry for iron ore has been received in Cleveland from Rotterdam, but is not considered seriously because the ore is evidently intended for shipment to a country not friendly to England, and being contraband of war, its shipment would be almost certain to be intercepted. The inquiry indicates that Germany may be in need of ore.

Buys African Ore

New York, Dec. 15. — A Schuylkill furnace interest recently closed for a round block of North African ore for future delivery. This ore was introduced in the eastern market about a year ago. Deliveries during the current year amounted to about 50,000 tons and approximately 100,000 tons are under contract to come in during 1915. The ore is a Bessemer soft hematite, averaging about 60 per cent metallic iron and comes from the province of Tunis, North Africa. Barring some recent transactions in Cuban ore, previously reported, the closing of these lots of African mineral constitute about the only breaks in the dull market for foreign ore that has prevailed in the east. At the present time, the situation is without feature.

(*For complete prices see page* 1154.)

Boiler Tubes

Sold at Low Prices—False Report as to Pipe Line

Pittsburgh, Dec. 15.—It develops that a recently incorporated pipe line company, which will operate a line from the Mississippi river to the eastern seaboard, will not buy pipe and accessories, as reported in some centers. The company, it is learned, will take over properties of a concern now owning a line extending half way across the continent. The National Tube Co., under date of Dec. 11, issued new cards on California casing and drive pipe, which is designed to meet the requirements of California deep well territory. The cards provide reductions of about 5 per cent in price and conform with cards on oil country goods issued under date of Dec. 1. Boiler tubes, weak and irregular for 12 months, continue to sell at prices lower than those provided by published cards. Steel boiler tubes, ranging from 3½ to 4½ inches, are being offered at 74 off list by some makers, or $4 a ton less than the nominal price. In some cases three fives additional are granted.

Tin Plate

Large Consumers Covering for Their Year's Requirements

Pittsburgh, Dec. 15.—More important consumers of tin plate have been getting under cover for 1915 needs, and, as is generally the case, attractive tonnages have been obtained at less than the general market price, $3.20 per base size box. On the other hand, some fairly heavy tonnages have been taken at that figure, and the market appears considerably firmer today than the middle of last week. Uncertainty characterizing the market for pig tin has tended to stiffen the tin plate price the last three days. Pacific coast packers have been playing an important part in the buying, and material already has been shipped to western coast points, via the Panama canal.

The American Metal Co., Park building, Pittsburgh, manufacturer of babbittless bronze bearings, is operating its plant at capacity.

Restrictions on Ferro

Extend to Steel Exports, But Comparatively Few Companies Will Be Affected

Pittsburgh, Dec. 15.—While satisfactory arrangements have not yet been made with reference to importing ferro-manganese, yet dealers and consumers in this district do not appear concerned about the future. So far as can be ascertained, no inquiry of importance is before the trade. Reports, circulated throughout the east 10 days ago, that the Carnegie Steel Co. is offering this alloy at $65, seaboard, are officially denied.

Effects of Restriction

New York, Dec. 15.—Sellers of ferro-manganese in this country now are arranging with consumers to comply with the provisions stipulated by English makers, whereby the embargo on shipments to the United States may be lifted. These conditions were outlined in cable advices received during the past week by direct representatives in this country of the English producers. These communications have stated that license to ship probably can be obtained upon the guarantee of the buyer that none of the ferro-manganese thus received shall be re-exported to Germany, Austria-Hungary, Turkey or "contiguous countries". They further stipulated that no finished or semi-finished steel, in the manufacture of which the new deliveries of ferro-manganese are used, shall be exported to neutral countries, except through London.

The restriction upon the exports of steel from this country thus attempted by the English government, while it probably will cause considerable trouble and confusion, virtually is not as drastic as it appears on the surface. None of the independent steel makers who are the principal buyers of English ferro-manganese in this country regularly do a large export business. Such increased trade of this character as they have enjoyed since the outbreak of the war, chiefly has been with Great Britain and its allies. It also is pointed out that since consumers in this country now have large stocks of ferro-manganese on hand, the latter would fill their requirements for a long period for the making of such steel as they might wish to export and in this manner they can avoid the provision of dealing through London.

The first large shipment of ferro-manganese to this country to leave England since the embargo went into effect, arrived at Baltimore the past week on the Hamilton Range, and amounted to about 1,600 tons. This shipment was brought in, it is understood, by an eastern merchant who recently affected an arrangement with the English government whereby he could ship about 2,000 tons, as was previously reported.

The price of ferro-manganese remains unchanged at $68, seaboard, and sellers continue to solicit business at this figure, subject to their ability to make arrangements to ship. Very little inquiry now is in the market.

Shipyard Inquiry Brisk

Eastern Plants Figuring on Important New Construction —New Inquiry From Scotland

Philadelphia, Dec. 14.—Eastern shipyards continue to figure on a large volume of new construction, but as details are guarded, little is known of the shipping interests that are in the market or of the character of the boats. One eastern plate maker was asked for prices on three different propositions, the past week, two new and one a repair job, the requirements totaling in excess of 5,000 tons of plates. The Newport News Shipbuilding & Dry Dock Co. now has upon its ways two tank steamers for the Standard Oil Co., but it is not stated whether this is old or new work and whether it includes a boat recently inquired for by that company. The Pennsylvania railroad will release a considerable tonnage of plates, for 1,050 steel box cars, the building of which is about to be undertaken at Altoona, as a part of the 1914 budget. The Jones & Laughlin Steel Co. has taken 250 tons of circular plates additional for Panama. Some buyers including several railroads are offering to contract, but makers are not desirous of such business at the market, which for early specification now pretty generally is quoted at 1.20c, Philadelphia, or 1.05c, Pittsburgh. One or two makers still hold $1 higher. On a new inquiry for 2,000 tons of ship plates for Scotland, the buyer offered £5 17s 6d delivered per gross ton or about $28.80, delivered, which, however, will not permit of business because of the high freights. Plates for export have been quoted at less than 1.15c, tidewater, by nearby mills.

Plate Inquiry Heavier

Pittsburgh, Dec. 15.—Consumers of steel plates, in a great many cases, have opened negotiations for first and second quarter requirements, and moderate improvement characterizes the market for shipment this month. While plates for immediate shipment continue to be sold at 1.05c, yet some manufacturers are asking 1.10c for first quarter, and as high as 1.20c for second quarter shipment. The Pennsylvania railroad, which expects to build 1,050 steel box cars at its Altoona shops, has not yet covered for the structural steel involved nor the car wheels, so far as can be learned at this center.

Little Ship Yard Work

Cleveland, Dec. 15.—Work in ship yards along the lakes is extremely limited; in fact, the yards are almost entirely idle and the outlook for the winter is discouraging. Little new construction is contemplated and there is less repairing to be done than in any winter for many years. The plate market is dull and 1.05c, Pittsburgh, is the ruling price on anything approaching desirable business. Contracts are usually made for the first quarter, but are sometimes made for the first half.

No Strength in Plates

Chicago, Dec. 15.—Steel plates continue to be sold at 1.19c to 1.24c, Chicago mill, with comparatively little demand and no signs of improvement in prices or tonnage. Rumors are heard of plates being sold here and there at even lower than the minimum just quoted, but verification is lacking.

No Hearings

Washington, Dec. 15.—The Senate commerce committee today voted down a motion, made by Senator Smith, Republican, of Michigan, 9 to 5, for hearings on the administration ship purchase bill. Voting with the Republicans in the affirmative was Senator Vardaman, Democrat, of Mississippi. The committee meets tomorrow, when its members supporting the measure will attempt to have it reported favorably to the Senate in the hope of taking it up in that body immediately after the Christmas holidays.

(*For complete prices see page* 1154.)

Scrap at a Standstill

In Western Pennsylvania and Eastern Ohio—Not Much Activity Elsewhere

Pittsburgh, Dec. 15.—After a flash of activity, featured by advancing quotations, the iron and steel market in western Pennsylvania and eastern Ohio again is at a standstill. Heavy melting steel is being held at $10.75 and $11 by some middlemen, but there has not been enough selling this week to offer new developments. Other grades showed moderate strength last week, but further improvement probably will not be noted until after Jan. 1. Consumers will not figure in the market, it is apparent, until demand for finished products becomes heavier.

Less Activity in East.

Philadelphia, Dec. 14.—There seems to be less promise in the old material market in this district this week than last, when some revival was indicated. This better activity has subsided, in part at least, and the dealers are not appearing so much in the market. The price of heavy melting steel seems firm at $9.50 minimum and several works probably would pay that figure for a good block, but sellers are not anxious for such business. Cast scrap maintains a better demand. Low phosphorus is sought by some consumers, but the supply is limited. Small sales were made this week at a shade under $14, delivered. Sales of rolling mill turnings at $7.50, delivered, and of shafting at $14, delivered, are noted. Offers of $9, delivered, for stove plate are current. Several grades are quoted lower this week.

General Tone Better

Cincinnati, Dec. 14.—The general tone of the scrap market is undoubtedly better and the melt heavier, but dealers report that sales have not been affected as yet, and that conditions with them are unchanged and very quiet. This can be attributed to the fact that such a large surplus accumulated during the past eight or ten months, during which time the market was at a standstill, that it will take a long period of activity before enough can be consumed so that the effect can be noticed. Prices have not changed, but have become a little stronger during the past few days, and are gradually reaching a point where they can be placed on a general basis governing all sales. At present, different quotations are being made on each sale, depending upon conditions, and this situation will undoubtedly remain until a large portion of the surplus of scrap on hand has been used.

Scrap Prices Higher

Chicago, Dec. 15.—Dealers in iron and steel scrap in Chicago continue to advance their quotations and so far have maintained their new levels, although there is no increase of buying by consumers. Advances of 25c to 50c per ton have been made in expectation of heavier buying within a short time, but the tonnage moving to consumers is not increasing. Railroad lists at present before the trade are as follows: Michigan Central, 2,200 tons; Union Pacific, 1,250 tons; Standard Oil Co., 200 tons.

No Activity

Cleveland, Dec. 16.—Several mills having come into the market and filled their needs for several months, the iron and steel scrap trade is marking time. A leading valley heavy steel consumer now is out of the market until April. The better sentiment among dealers evidenced in the past few weeks is unabated, but it is agreed little business is to be expected until after the year-end inventory. Prices are unchanged.

Cast Pipe

Order Taken for Shipment to Australia —Chicago in Market

New York, Dec. 15.—A liberal volume of new business continues to be offered in the cast iron pipe market both by public and private buyers in eastern territory. The tone of the situation is better, and the foundries regard the outlook as considerably more promising. Prices, however, still manifest small improvement. While some of the shops are asking more for their pipe, competition usually brings out figures quite as low as those which recently have prevailed. The Brooklyn Union Gas Co. is in the market for 2,700 tons of 6 and 12's. Providence, R. I., asks 890 tons of 4 to 16's for Dec. 31. Muskegon, Mich., recently took bids on 570 tons of 4 to 10's. Haverhill, Mass., is inquiring for 200 tons of 4, 6 and 8's. Bids are going in this week on 7,700 tons for Baltimore and 300 tons for New Britain, Conn. Lawrence, Mass., took bids Dec. 5 on 171 tons of 4, 6 and 8's. C. F. Glavin was low on $22.60, delivered, for the 4's, and $20.38 for the 6 and 8's. R. D. Wood & Co. were next at $22.89 for the 4's and $21.39 for the others. The Pennsylvania Steel Co. has awarded 240 tons of 20, 36 and 48's to R. D. Wood & Co., at $18.25, delivered Steelton. The Standard Cast Iron Pipe & Foundry Co. took 250 tons for East Orange, Mass., at $19.35, delivered, for 6's and $19.40 for 8's. The United States Cast Iron Pipe & Foundry Co. has 223 tons for Newton, Mass.

More Active

Chicago, Dec. 15.—Demands of municipalities for their requirements of cast iron pipe for the coming year are being brought to the market in better volume. The United States Cast Iron Pipe & Foundry Co. has taken 500 tons for shipment to Townsville, Queensland, Australia, for use of an American corporation with a plant there. This business ordinarily would have been taken by an English maker.

The City of Chicago will have three lettings of 2,500 tons each in Dec. 21, 22 and 23. The lettings are split thus to allow small concerns to have an opportunity to participate in the bidding. Kansas, Ill., will open bids Dec. 21 on 200 tons. Cuba, Ill., has awarded 400 tons to a contractor in St. Louis, who has not placed the tonnage with a foundry.

Nuts, Bolts and Rivets

Pittsburgh, Dec. 15.—Nuts, bolts and rivets continue to sell at low prices. Structural rivets, nominally listed at 1.45c, have been obtained at less than that figure in a number of instances, and discounts on nuts and bolts continue irregular. Demand is light and sales have been inconsequential.

Will Build Stumpf Engine

The Mesta Machine Co., Pittsburgh, recently has acquired the rights from the Stumpf Una-Flow Engine Co., Syracuse, N. Y., to build the Stumpf Una-Flow type of engine in the United States. The agreement gives the Mesta company the patent rights of Prof. Stumpf, and the benefits of practical experience gained by European builders the last six years. A large number of engines of this type are in use in Europe.

The Mesta Machine Co. is making shop drawings of various sizes of engines for rolling mill purposes. The company also will build large units for driving electric generators, air compressors, hoisting engines, etc.

It is stated many engines in European mills, having ordinary types of cylinders, have been equipped with the Una-Flow type cylinders.

(*For complete prices see page* 1154.)

Lightest of the Year

Were Structural Awards of December—Competition Brings Out Very Low Prices

New York, Dec. 15.—Structural awards in the country during the month of December were the lightest of the current year and totalled about 20 per cent of the shop capacity, or about 35,000 tons, according to the statistics of the Bridge Builders' and Structural Society, reported at its monthly meeting at Pittsburgh, Dec. 11. The November bookings compare with about 60,000 tons in October, 65,000 tons in September, 50,000 tons in August, 115,000 tons in July, 95,000 tons in June, 100,000 tons in May, 150,000 tons in April, and 130,000 tons in March. The volume of structural business in this territory remains small and competition for both plain and fabricated material has become even keener. On plain material, 1.21c, New York, or 1.05c, Pittsburgh, more commonly is named, and this delivered figure has been shaded by certain mills giving away their advantages in freights to this territory. In fabricated steel, the Geo. A. Just Co. has placed at low prices 1,800 tons for a new Jacob Rupert Brewery in this city, for which they have the erection contract. The beam work is reported to have gone about 1.70c, delivered. On 1,200 tons of steel pier work at New Bedford, Mass., the John Cashman & Sons Co., Boston, was low bidder at 2.25c per pound, erected, for the steel. The other bids ran from 2.40c to 3.50c, erected. Leading fabricators expect the balance of the year and up to the middle of January to be very quiet in new work.

Price Softness at Philadelphia.

Philadelphia, Dec. 14.—Price softness in the structural shape market in this territory has become pronounced owing to the practice of several makers in absorbing a part of their Pittsburgh freight. Sales by one or two makers are reported at less than 1.20c, delivered, in Philadelphia and vicinity, which are equivalent to less than 1.05c, Pittsburgh, though the rolling mill usually has been netting more than that figure. The usual price which makers, apart from those one or two aggressive sellers, now are naming is 1.20c, delivered, in this district or 1.05c, Pittsburgh. The market is very slow. Some eastern Pennsylvania shape mills now are operating only two or three days weekly and in certain cases, not over 33 1/3 per cent of capacity is active. Fabricators complain of the severely light volume of new work. One large interest reports its bookings for the first half of December are less than 300 tons, when they should be normally a good many thousands.

Structural Inquiry Better

Pittsburgh, Dec. 15.—Fabricators in western Pennsylvania have experienced a moderate improvement in demand for structural material. Shops are in need of additional tonnages, and decidedly low quotations continue to come out. The Jones & Laughlin Steel Co has taken an order for 500 tons for the Morrow Mfg. Co., maker of automobile parts, at Elmira, N. Y.

Very Active Competition

Cleveland, Dec. 15.—The most important contracts placed recently in this district are those awarded by the Willys-Overland Co., Toledo, for new construction, involving 2,250 tons of steel, as follows: Factory building, Elmira, N. Y., 500 tons, to the Jones & Laughlin Steel Co.; addition to the Toledo plant, 1,600 tons, to the Donovan Iron & Wire Co., Toledo; bridge work for the Toledo plant to the Toledo Bridge & Crane Co., 150 tons. A 14-story hotel to be erected at Superior and East Ninth street will call for a considerable tonnage, which it is expected will be placed soon by the Chicago architects, H. L. Stevens & Co.

Competition is exceedingly active and some very low prices are being made. One bidder on the plant of the Willys-Overland Co. expresses the opinion that a number of companies bid on the basis of 1.05c, Pittsburgh, for plain material and did not take into consideration at all overhead charges or profit. There was, however, considerable variation in the bids on the Toledo works, as at least a part of the more desirable tonnage is known to have been figured on the basis of 1.10c, Pittsburgh.

Larger Tonnage is Taken

Chicago, Dec. 15.—Structural contracts closed the past week aggregate a considerably larger tonnage than has been the case for several weeks. The largest item is 3,100 tons for the Keokuk and Hamilton Mississippi river bridge at Keokuk, Ia., which goes to the Strobel Steel Construction Co. The Mt. Vernon Bridge Co. has been given the fabrication. Another large item is 1,134 tons for the new building of the Missouri Athletic Association at St. Louis. Bids have been asked on the W. W. Kimball building, Chicago, and the award is expected to be made this week. The tonnage involved in this item is about 4,000.

(*For complete prices see page* 1154.)

CONTRACTS AWARDED.

Willys-Overland Co., Toledo; factory building, Elmira, N. Y.; 500 tons, to Jones & Laughlin Steel Co.; addition to Toledo plant, 1,600 tons, to the Donovan Iron & Wire Co.; bridge work for the Toledo plant, 150 tons, to the Toledo Bridge & Crane Co.

Morrow Mfg. Co., Elmira, N. Y., plant extension involving 500 tons, awarded the Jones & Laughlin Steel Co.

Caisson work at Panama canal, 150 tons, awarded to Jones & Laughlin Steel Co.

Keokuk and Hamilton Mississippi river bridge, Keokuk, Ia., 3,120 tons to Strobel Steel Construction Co.

Missouri Athletic Ass'n building, St. Louis, to Christopher & Simpson, 1,134 tons.

City of San Francisco, structural steel for station, Twin Peaks, tunnel, 412 tons to Pacific Rolling Mill Co.

Fabrication contract for 1,800 tons for a new brewery for the Jacob Rupert Brewing Co., Ninety-second street, New York City, placed by erectors, the Geo. A. Just Co., with an eastern shop.

Y. M. C. A. in the Bowery, New York City, 500 tons, general contract awarded to the Geo. A. Fuller Co.

CONTRACTS PENDING.

Cotton warehouses at New Orleans, of concrete type, 3,000 tons of shapes and about 4,000 tons of reinforcing bars, bids being taken. Ford, Bacon & Davis, 115 Broadway, are engineers.

Storehouse for Bureau of Yards and Supplies of navy department at Washington, 1,300 tons, McClintic-Marshall Co. low bidder, but concrete construction may be adopted as attractive propositions of this kind have been made.

Nine fuel oil tanks for naval stations at Norfolk, San Diego, Mare Island, Bremerton, Washington, and Melville, R. I., 2,000 tons, Pittsburgh-Des Moines Bridge Co. low bidder.

Section No. 4 of the Broadway-Fourth avenue subway extensions New York City, 4,860 tons, taking of bids deferred from Dec. 11 to Dec. 29.

Addition to plant of Keystone Plaster Co., Chester, Pa., 325 tons; bids taken.

Trenton Engineers' Club

Trenton, N. J., Dec. 14.—The Engineers' Club held a meeting on Dec. 10 and elected these officers: President, Alfred C. Gregory; first vice president, Newton A. K. Bugbee; second vice president, Fred C. Carstarphen; secretary, Joseph E. English; treasurer, John E. Elliott; board of governors, Alfred S. Bellis, Frank Bunn, Frank J. Eppele, City Commissioner J. Ridgway Fell, Alexander P. Gest, Frank W. Kennedy and Abram Swan Jr. Following the meeting C. K. Waller, chief engineer of the Delaval Steam Turbine Co., gave a talk on "Steam Turbines".

The club will hold a dinner on Jan. 7 and Secretary of the Navy Daniels has been invited to be the main speaker.

Money and Iron: Fact, Comment

Greatly Feared Dangers on Stock Exchange Averted

Unexpected Strength Displayed by American Securities—European Investors Buying in This Country—Financial Developments of Importance to the Trade

"Capital is timid; it likes to go where it can get back. We are not lending any more money to continental Europe," said a London banker to David Starr Jordan, president of Leland Stanford Jr. University, not long before the war was declared.

Soon after war was started, a prominent pig iron manufacturer of Cleveland predicted that the vast quantity of American securities held by people of moderate means in Europe would be kept by them and not dumped upon this country.

A high official of a leading New York bank recently said he did not expect a deluge of selling by foreign holders when the exchange opened. He based his opinion, he said, upon human nature as he interpreted it under such circumstances. He believed that in a time of such stress it was logical to expect owners to hold to the best securities they had and to make any sacrifices, if necessary, in the stocks upon which the investment return was less assured. American railroads or industrials, he considered, are the best stocks which any investor living in the war-stricken countries could hold at the present time, because they are the ones most likely to earn dividends if any companies could under prevailing conditions of business, inasmuch as their ability to carry on normal operations was unimpaired and they would enjoy some benefits from reduced competition as the result of the war.

In spite of such declarations, however, there has been a great fear in this country that there would be a deluge of American securities in the New York stock exchange as soon as the doors were opened. The deluge did not come. True, the doors were opened cautiously, but if a general desire to sell American securities had existed, sales this week would have been much heavier than they were. It is known that European money has been invested in American bonds very recently, and it is believed that some American stocks have been purchased by European investors.

The strength of the stock market since last Saturday is indeed surprising. While, doubtless, there was some artificial support, it is also clear that much of the buying has been due to a conviction on the part of a great many investors that a period of wonderful prosperity will be enjoyed by this country at a not far distant date. There was no special significance in the ups and downs of Steel common Tuesday and Wednesday.

Opinions are bound to differ as to why this country has been able to straighten out financial difficulties so well during the past few weeks. Much is, no doubt, due to the wisdom of the governing board of the New York stock exchange. The Federal Reserve banks are also credited with being a factor. But whatever the cause, the important thing is the fact that all dangers have been averted and there are no indications of unfavorable developments.

It is to be noted that trading was not resumed in all stocks until Tuesday, notably in the case of United States Steel. The action to exclude from trading these stocks, was in all probability taken by the board of managers of the exchange because of the fact that Steel stocks are the most widely held of all American industrials by foreign investors. This is especially true of the common. The possibility of heavy selling of Steel, with its serious sentimental effect on other shares, was recognized and it was deemed best to have its reopening come gradually.

Manufacturers who have sold iron and steel products and other materials to countries at war, or are about to make such sales, are being asked to accept treasury notes of the warring countries in payment, instead of cash. Until recently, it was understood that all of the machine tools, motor trucks and other materials exported were to be paid for in cash before any of the exports left American shores. In many cases, this has actually been done. The change of policy is taken to indicate that the American debt to Europe which existed at the opening of the war has been wiped out.

Whether the debt has disappeared or not, there is general agreement that the American people will find it necessary to make extensive investments in foreign lands. Sir George Paish, special advisor of the British treasury, in an interview in *System*, for December, when asked what he would do if he were an American manufacturer, said he would get all the orders he could, and he added:

"The question for the American manufacturer is not only where he will sell, but how to obtain payment for what he wishes to sell. The world's ability to buy has been greatly reduced by the contraction of credit facilities. It is obvious that the world's great credit market—Europe—is practically closed for loans of capital other than for war purposes; that the world is not enjoying the normal amount of credit it usually enjoys when Europe, and more especially England and France, are able and willing to lend freely to the nations.

"A large part of the goods sold abroad by England, France and Germany has been paid for in securities. If American manufacturers are to extend largely their trade with other countries at the present time, the American people must provide the credit facilities to other nations which the latter obtain in normal times from the European countries now engaged in war."

Sensible Optimism

Extravagant language is being used by a great many people nowadays in talking about the undoubted opportunity which lies before the American people and it is refreshing to see a well

worded document which presents conditions in a sanely optimistic fashion. Such a document has just been issued by the Lake Superior Iron & Chemical Co., which discusses the important conditions now affecting business, and quotes from the recent letter of President Wilson to Secretary McAdoo, referring especially to this paragraph from the letter:

The railroads of the country are as much affected, not so much because their business is curtailed as because their credit is called in question by doubt as to their earning capacity. There is no other interest so central to the business welfare of the country as this. No doubt, in the light of the new day with its new understandings, the problems of the railroads will also be met and dealt with in a spirit of candor and justice.

The following summary as to present conditions is given:

That such legislation as has been in the political mind is now a fact and we know definitely upon what we may count.

That the new currency legislation will furnish a more sound basis of credit and minimize the financial uncertainty of recent years.

That in all probability state legislatures will take their cue from Washington as they usually do and cease abuse of business interests.

That the President's letter furnishes assurance of a discontinuance of further distressing agitation at Washington.

That the public mind has reached a state which will not tolerate further tampering with the business of the country.

As Babson Sees It

Babson has been in the national capital and has imbibed considerable optimism from his talk with John Skelton Williams, comptroller of the treasury, and others. Babson says in *The Saturday Evening Post,* that if this country does not go to war, conditions will adjust themselves very soon. If this is true, the adjustment ought to be at hand very soon, for there does not seem to be the most remote possibility of the United States becoming involved in the European war. Says Babson:

"Every shipload of merchandise swells our exports; every foreign mill shut down reduces our imports; every American forced to give up a European trip builds up our gold reserve; while every reduction in dividends and decline in security prices likewise keeps money in this country. Therefore it should be but a short time before we are the great creditor country of the world, instead of being in debt to other nations, as at present. This should loosen up money, cheer up our bankers, and enable readers of this weekly to borrow as heretofore.

"Manufacturers who have not sufficient orders to keep their mills going must of necessity run on part time, or possibly shut down altogether for a week or so. No manufacturer or merchant, however, should reduce his salesforce or cut down his advertising under present conditions. For American concerns to cut down their salesforces and advertising, under the conditions ruling today, seems to me to be the height of folly."

The above sound advice as to advertising is given in spite of the fact that Mr. Babson says that personally he feels that most lines of business will be dull until there are some signs of peace. The favored ones in the meantime will, he says, be the farmers and a few concerns that are temporarily helped by foreign war orders and the cessation of foreign imports. Those who keep up their organizations during the trying times through which we are now passing, he concludes, will be the first to receive the fruits of the period of prosperity that is to follow.

No Stock to Employes

Owing to the depressed condition of business and to the abnormal condition in the securities market, it is announced that the United States Steel Corporation will not offer stock to employes for subscription in 1915. This will be the first year since the stock-buying and bonus plan for employes was instituted by the Steel Corporation in 1903 that the subscription has been withdrawn. At the present time, more than 50,000 employes of the Corporation have become stockholders under this plan. The subscriptions in 1914 were made by 46,498 employes for an aggregate of 42,926 shares of preferred and 47,680 shares of common, at the fixed prices of $105 for the preferred and $57 for the common. The annual allowances for five years for subscribers who retain their holdings were fixed at $5 per share for the preferred and $3.50 for the common.

Declared Insolvent

Trenton, N. J., Dec. 14.—A corporation having millions of dollars of stock in other companies, and which fails to pay dividends, is insolvent, according to an opinion filed by Chancellor Walker against the International Power Co. The chancellor decided that the company was insolvent, that a receiver should be appointed and that an injunction should be issued against the concern.

Henry W. Bull; a stockholder, of New York, and other stockholders of the company brought suit against the company. They own 400 shares of the common stock of the par value of $40,000 and 100 shares of the preferred stock of the par value of $10,000, out of a total issue outstanding of $6,400,000 par value of common and $6,000,000 par value of the preferred stock of the company. The concern is a New Jersey corporation and by its charter was authorized to manufacture, buy, sell and deal in locomotives, engines, cars and certain other mechanisms, and to purchase, mortgage and deal in stocks and bonds of other corporations, etc. The company is charged with ignoring an order of the Supreme Court to bring its books into this state for an inspection by a Supreme Court commissioner.

Financial Notes

The Lozier Motor Co., Detroit, has confessed its insolvency in the federal court in that city. Judge Tuttle has sent the case to Referee Lee Joslyn, and the plant and other assets of the company must be sold at receiver's sale.

Business of the Century Foundry Co., Syracuse, N. Y., will be continued by Mark E. Cowan, receiver, if such a course is deemed advisable after an investigation of the company's affairs.

The American Iron & Steel Mfg. Co., Lebanon, Pa., has declared the regular quarterly dividends of 1¼ per cent on both the preferred and common shares, payable Jan. 1 to holders of record Dec. 19.

The Wheeling Sanitary Mfg. Co. has increased its capital stock from $25,000 to $75,000 to replace certified bonds held by stockholders with stock certificates.

Commercial failures last week in the United States as reported by R. G. Dun & Co. were 461, against 493 the preceding week and 420 the corresponding week last year. Failures in Canada numbered 79, against 88 the preceding week and 46 last year.

One More Active Stack

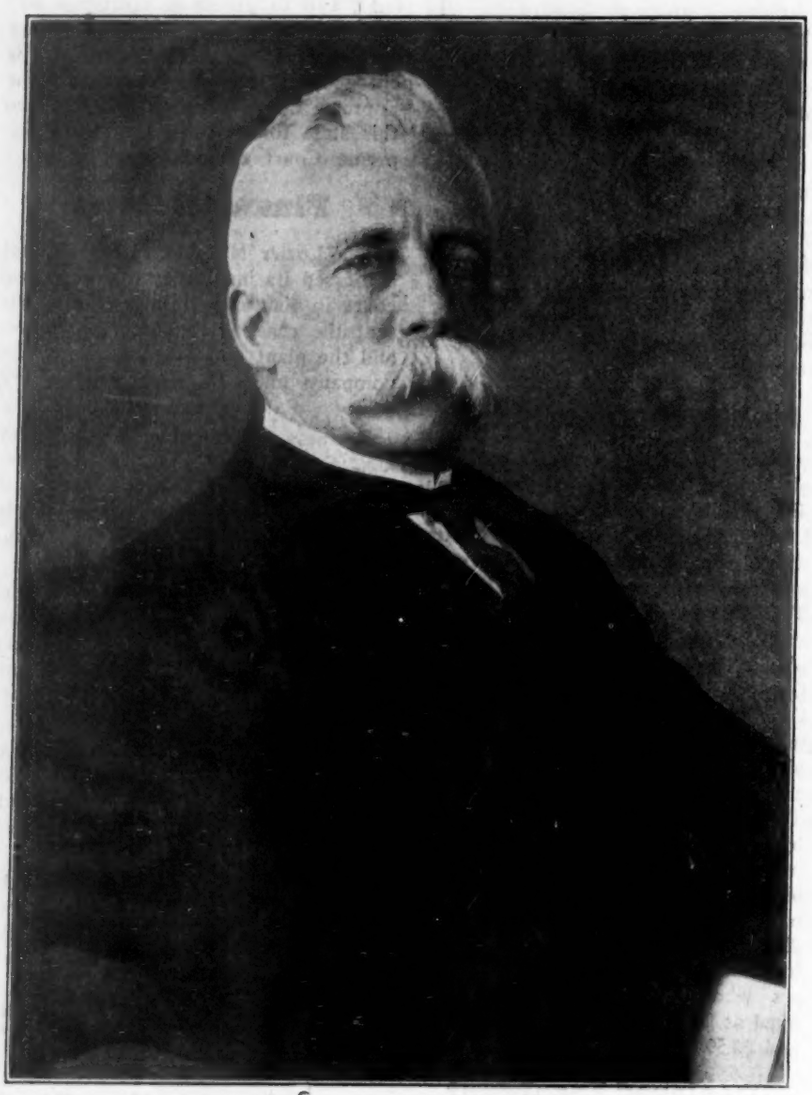
Chicago, Dec. 14.—One blast furnace has been blown in at the Gary works of the Illinois Steel Co., making three stacks at Gary and increasing the operations of the United States Steel Corporation furnaces to nine out of 25 in this district.

Operations of steel mills in Chicago and vicinity are on the same schedule as last week. Ingot production remains the same, about 26 per cent of capacity. The rail mill at the Gary works has been idle since Nov. 1.

Steel Sash

Would Have Prevented Burning of Edison Buildings

A large force of men now is at work clearing the site preparatory to the reconstruction of the extensive works of the Thos. A. Edison Co., Inc., at Orange, N. J., which suffered heavy loss by fire Wednesday evening, Dec. 8. Only three of the 22 buildings now are standing and the loss is estimated at about $5,000,000 to $7,000,000, with $2,000,000 of insurance. The Edison experimental laboratory and the storage battery buildings were the only ones of importance that were saved from the conflagration. The fire originated in the film house and was the result of an explosion.



COLONEL EDWARD D. MEIER

George N. Cole, mechanical engineer, of 1328 Broadway, New York City, writes THE IRON TRADE REVIEW that immediately after the fire he made an inspection of the buildings and was thoroughly surprised to see the excellent showing made by reinforced concrete. He says:

"Buildings filled with oily material and with the driest kind of lumber were burned so that there was not a vestige of them left, and yet the buildings with their columns, beams and floors were in a remarkably well preserved condition, so that we felt perfectly safe in roaming about the sixth floor of the building, in which a line of three continuous columns 20 feet high had been so shattered by water that there was a clear vision across them on the first floor, being held together only by the reinforcing steel. The only place in which the structure had really failed was in a top corner of a six-story building where some heavy tanks of a solution used in nickel plating had been placed.

"Concrete made a magnificent showing. If the buildings had had steel sash and wire glass, little, if any, of this plant would have gone, but they had wooden sash four or five frames wide with ordinary glass inserts, and as the buildings burned they are said to have been blown outward from time to time as if by explosion. They expect to shore up around injured columns and repour enough concrete to enclose proper reinforcements, and will possibly cover the floors with another slab, in some places. I might state that the brick buildings are all level with the ground with iron trusses covering the ruins, and also that the frame buildings are unscathed by fire, as the firemen put up a big fight for their preservation at the entreaty of Mr. Edison. This possibly accounts for some of the terrific heating that the concrete buildings received."

Death of Edward D. Meier

New York, Dec. 16. (By wire.)—Col. Edward Daniel Meier, president of the Heime Safety Boiler Co., St. Louis, and past president of the American Society of Mechanical Engineers, died here last night, aged 73. He represented the American Society of Mechanical Engineers at Munich last year at a joint meeting with German societies and several hundred from this country attended.

William H. Howe, aged 51, president of the Wm. H. Howe Ice Machine Co., died Saturday at his home in Chicago. He had been a resident of Chicago since 1900.

Herman Smith died Dec. 4 at Seaside, Oregon, where he had gone to regain his health. He was vice president of the Smith & Watson Iron Works at Portland, Oregon.

Charles M'Nellis, a pioneer brass manufacturer and president of the Imperial Brass Mfg. Co., died Dec. 7 in Chicago, aged 63 years. He founded the Imperial company in 1905 after being connected with other similar concerns in Chicago since 1864.

George Wettengel, aged 90, for many years manager of the James Woods & Co. Eagle Iron Works, Pittsburgh, died Dec. 11, at his home in that city. He was identified with the Eagle Iron Works for 24 years, leaving that concern to join the firm of Wettengel & Gormley, coal merchants and contractors.

John A. Brashear, president of the American Society of Mechanical Engineers, talked on "The Science of Things in Everyday Life," last week before the Traffic Club of Pittsburgh, at Hotel Schenley, that city.

MEN OF THE IRON TRADE

Who they are Where they are What they are doing

John A. Stevens, chairman of the boiler specifications committee, or, to give it its formal title, the "committee to formulate standard specifications for the construction of steam boilers and other pressure vessels, and care of same in service," of the American Society of Mechanical Engineers, is regarded generally as one of the foremost experts on all practical questions relating to the field of steam engineering. In addition, during the three and one-half years he has had charge of this committee he has gained a reputation as a skillful tactician. That this reputation has been well earned is indicated by the stage of comparative completion which the work of the committee, despite numberless obstacles, has reached; this work was described in last week's issue of THE IRON TRADE REVIEW.

Mr. Stevens was born in Galva, Ill., in 1868. He left school at the age of 12; but returned after seven years and graduated from high school at Saginaw, Mich., later spending one year at the University of Michigan. On leaving college, he served a three-year apprenticeship at the machinist's trade. Since then, his life has been devoted to the steam and power field. He worked for some time as an engineer on great lakes steamers and later on ocean liners. In 1896, he resigned as first assistant engineer of the steamship St. Paul, to become chief engineer for the Merrimack Mfg. Co., Lowell, Mass. For more than 12 years, he made all power plant layouts and estimates for that company. In 1909, he resigned and for a while studied power plant and steam practice in Europe, after which he returned to this country and embarked in business for himself, as consulting engineer. Mr. Stevens was a member of the Massachusetts board of boiler rules for six years, as a representative of the boiler using interests of the state. He was appointed to the A. S. M. E. committee in 1911.

Mr. Stevens is patentee of the water tube steam boiler and of the American steam superheater. His colleagues on the committee include some of the most thoroughly versed boiler men in the United States, and are representative of the various interests involved in the question of boiler code and boiler law revision. They are: William H. Boehm, superintendent of the department of steam boiler and fly wheel insurance of the Fidelity & Casualty Co. of New York; Rolla E. Carpenter, professor of experimental engineering, Sibley college, Cornell university; Richard Hammond, president of the Lake Erie Engineering Works, Buffalo; Charles L. Huston, vice president and works manager of the Lukens Iron & Steel Co., Coatesville, Pa.; Col. E. D. Meier, of the Heine Safety Boiler Co., St. Louis; Edward F. Miller, professor of steam engineering at Massachusetts Institute of Technology.

JOHN A. STEVENS

B. F. Hoffnacker, former chief assistant to the late John W. Boileau, Pittsburgh, now has charge of Mr. Boileau's office.

W. S. Chase, sales manager of the National Acme Mfg. Co., Cleveland, has returned from Europe.

Alfred C. Nelson, who has been associated with Arthur G. McKee, engineer, Cleveland, for nine years, has resigned to take up private practice ofter Jan. 1.

L. Hutchinson, formerly identified with the department of economics and foreign trade at the University of California, recently appointed a commercial attache of the government, conferred with manufacturers in the Pittsburgh district Dec. 14.

Alfred Clegg has severed his connection with L. B. Schoenfeld & Co., New York, and has associated himself with Morris Weil's Sons, Philadelphia, as manager of the import and export department.

Heinrich J. Freyn has resigned as third vice president of H. Koppers Co., Chicago. Mr. Freyn resides at 5201 Harper avenue, Chicago. He has not yet announced his plans.

John A. Brashear, recently elected president of the American Society of Mechanical Engineers, talked on "An Evening With the Stars", Dec. 16, before members of the Westinghouse Club, Pittsburgh.

D. M. Buck, chief chemist for the American Sheet & Tin Plate Co., Pittsburgh, read a paper on the "Influence of a Copper Content on the Corrosion of Iron and Steel", before a civic organization at Morgantown, W. Va., last week.

George L. Rudolph, deputy factory inspector in western Pennsylvania, predicts that mills and factories in that section of the country will enjoy more normal conditions by Feb. 1. His prediction was made after he had completed a trip through his district.

Z. T. K. Woo, general superintendent of the Hanyang Iron & Steel Works, Hanyang, China, and several associates, who have been visiting iron and steel plants in this country for several weeks, spent last week inspecting rolling mills and blast furnace plants in the Mahoning and Shenango valleys.

Adolph Becker, of the Becker Steel Co. of America, 90 West street, New York, returned from England recently on the New Amsterdam. While in England he was arrested as a prisoner of war, but was released when, after cable communications with this country, his American citizenship was established, which, however, was not until he had spent five days as a prisoner of war in the barracks.

James A. Farrell, president of the United States Steel Corporation, told newspaper men at Pittsburgh, Dec. 11, he believed business gradually is developing into larger volume, and expressed the opinion that actual improvement would be noted after Jan. 1. Mr. Farrell attended the dedication of a public school, named in his honor, at Farrell, Pa., last Thursday, and was entertained at Pittsburgh by A. C. Dinkey, president of the Carnegie Steel Co.

Some Decline

While Many Would Like to be on Commission

Washington, Dec. 15.—It will be 10 days or more, in all probability, before the President sends to the senate the names of proposed members of the Federal Trade Commission. The President has been giving this subject decidedly close attention for some time and apparently has experienced difficulty in finding the five men he desired, and, in instances, of getting permission to send in the names of some of them. Candidates for the commission are very numerous and many have been urged upon the President by Democratic senators and representatives. It is claimed that in giving consideration to all names suggested, the President has gone into the record and achievements of each through personal representatives. Several men of national reputation who have been asked to accept membership have been compelled to decline, not wishing to give up every connection with their business or professional lives, as required by the law.

Senator Simmons asked the President to name Samuel L. Rodgers, of North Carolina. Mr. Rodgers was formerly commissioner of internal revenue in the Cleveland administration, and is a banker, business man and farmer. Senator Kern and Representative Rausch, of Indiana, saw the President in behalf of W. B. Westlake, a Marion, Ind., editor. Senator Thompson urged that the President name Prof. Henry J. Waters, Manhattan, Kas., president of the Kansas agriculture college. Prof. Waters was considered by the President for secretary of agriculture. Representatives Alexander, Rucker and Shackelford, of Missouri, submitted the name of Edwin A. Krauthauf, business man of Kansas City.

Heckscher is President

Ledyard Heckscher, manager of the blast furnace department of the Alan Wood Iron & Steel Co., Philadelphia, was named as president of the Eastern Pig Iron Association for the ensuing year at the annual meeting recently held in Philadelphia. W. S. Pilling, of Pilling & Crane, Philadelphia, will continue to act as secretary of the association. Mr. Heckscher has been identified with the manufacture of pig iron in eastern territory for the greater part of his business career. After graduating from Harvard University, with the degree of A. B., in 1894, he entered the commercial laboratory of the Richard Heckscher & Sons Co., Swedeland, Pa., operating the Swedeland furnaces. After engaging in several mining ventures in South America and Mexico, he returned to Richard Heckscher & Sons Co. and became assistant general manager. In 1901, he was made general manager and in 1906, assumed in addition, the office of treasurer of the company. When Richard Heckscher & Sons Co. was absorbed by the Alan Wood Iron & Steel Co., several years ago, Mr. Heckscher became the manager of the blast furnace department of the latter company. He is a director of the Alan Wood Iron & Steel Co. and the Upper Merion & Plymouth Railroad Co. and is a member of the American Iron and Steel Institute, the American Institute of Mining Engineers, the Alpha Delta Phi fraternity and several clubs. His home address is Radnor, Pa. He was born in Philadelphia on Feb. 25, 1872.

Obituaries

William J. Walker, principal owner and head of William J. Walker & Co., 1722 Columbus road, Cleveland, jobbers of cold rolled strip steel, died Dec. 16 at his home in the Ellington apartments, following a short illness. Mr. Walker was widely known in iron and steel circles, having been engaged for the past seven or eight years in the strip steel jobbing business. For many years previous to his taking up this line he was superintendent of the rolling mills of the Otis Steel Co., Cleveland.

Henry B. Shields, who was one of the most widely known and successful blast furnace managers of the Mahoning valley for many years, died last Sunday at 4:30 p. m., at Steubenville, O. He was taken ill at Rochester, N. Y., three weeks ago with a cold, and returned to his home in Steubenville about two weeks ago, where he suffered several attacks of heart failure, this causing his demise. He was about 69 years old.

Mr. Shields first came into prominence in Mahoning valley business circles in the later 70's as the most efficient county clerk up to that time in Mahoning county. When he retired from office about 1881, he became manager of the Girard furnace at Girard, O., owned by A. M. Byers, of Pittsburgh. He made a splendid record as manager and later as a furnaceman, and continued as manager there until about 1901 when he, with others, projected the Continental Iron Co., of which he became president, with offices at Niles, O. Of late years he had not been actively identified with the manufacture of iron and steel. The funeral was held at Youngstown, O., Wednesday.

Busy Year

In Building in Detroit—Growth of Highland Park in Four Years

Detroit, Dec. 15.—Building operations will be resumed on rather a pronounced scale when spring opens, according to different Detroit contractors. A number of Detroit factories intend starting off at full force when winter breaks—particularly is this true of the motor car concerns which, now, are holding off somewhat.

Figures just compiled show that the past year has been one of the greatest seasons for building in the history of the city. Numerous office blocks, factories and residences have been constructed and while no figures on the probable cost of these buildings are available at this time, it is believed that 1914 will be one of the big years, despite the depression of the fall and early winter.

An indication of the growth of Detroit is shown by the recent police census of Highland Park, one of the residential suburbs. In 1910 Highland Park had a population of little better than 4,000; in 1914 the population is above the 25,000 mark. The other residential suburbs have grown quite as rapidly, in proportion. The big boost to Highland Park is the Ford motor works, employing as it does better than 12,000 persons.

Springfield Plant Damaged

Fire destroyed a part of the foundry and machine shop of the Robbins & Myers Co., Springfield, O. The electric plant was not damaged and there will be no interference in filling orders for motors, generators and fans. Arrangements have been made with adjoining manufacturers for use of their foundries until the Robbins & Myers Co.'s foundry can be rebuilt. The only delay will be in time required to transfer patterns to these outside foundries. The company has started clearing away debris for the construction of a foundry modern in every detail. The fire loss is entirely covered by insurance.

Interlake's Showing

Carrying its own insurance saved the Interlake Steamship Co., managed by Pickands, Mather & Co., Cleveland, about $346,000 in premiums during the past season, on the basis of rates current during the season. The total charges against the fleet of 35 steamers and two barges amounted to only $3,700, or $100 a ship.

THE ABC OF IRON AND STEEL

Electric Steel---II

BY F T SNYDER

IN commercial electric furnaces for steel-melting, the charge is poured out instead of being tapped. A tap hole has proved impractical to maintain with the relatively small charge of the electric furnace.

There are various types of pouring apparatus in use. In the most common, the furnace rocks forward on rocker moving on a horizontal track. In this, the end of the spout moves forward and down.

In pouring, the ladle has to move correspondingly to keep the molten steel going into the ladle. This is readily done with a large ladle on a crane. For hand-ladle service used in pouring small castings and ingots, the furnace is arranged to pour by rotating about the end of the spout. This is called tilting. As the end of the spout does not move, the small hand ladle can be readily kept under the stream of steel. In the third or dumping arrangement, the furnace rotates on trunnions. The spout moves down and back. This is commonly used with small furnaces, as the spout movement is small and readily followed with a hand ladle. Furnaces of ½-ton holding capacity and larger are usually rotated by electric motors. Smaller furnaces are rotated by hand wheels. Hydraulic operation is not satisfactory as the electric furnace does not radiate enough heat to keep the water from freezing in cold weather.

The electrodes are supported by different forms of holders. To these holders are attached the leads which carry current to the electrode. In some special furnaces, the holders are supported from the building, leaving the furnace free of electrical connections. Close regulation of the position of the electrode is not practical with this arrangement. With most electric steel furnaces the holder is attached to the furnace body. Slides and gearing are arranged so that the electrodes can be moved up and down to regulate the arc. With large electrodes the weight is so great that this gearing has to be driven by motors. With small electrodes hand wheels can be used to move the electrodes. The movement of the electrode required varies with the different types of current regulation. The electrodes are made of carbon, either amorphous or graphitic. The latter has about double the conductivity of the former both for electricity and for heat. With the three-phase furnaces carbon

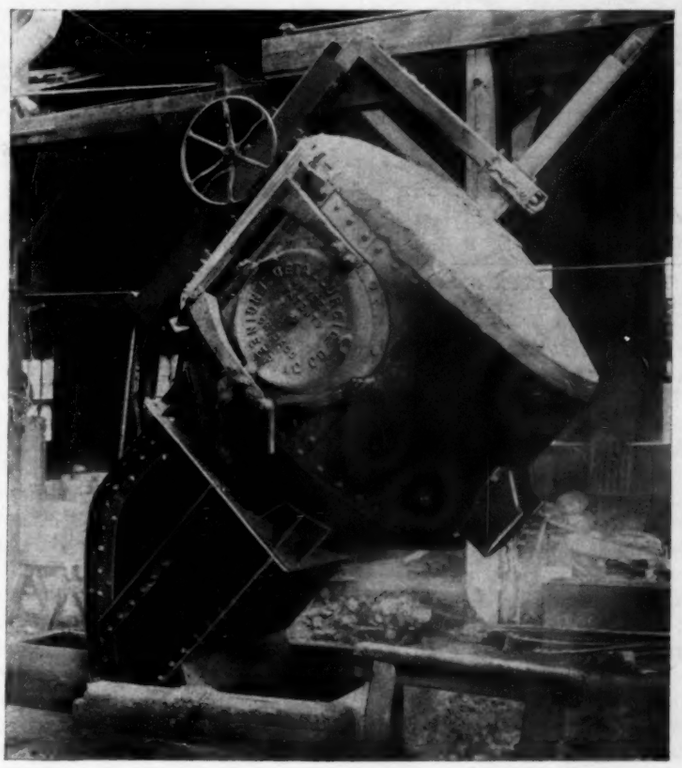


FIG. 7—TILTING TYPE OF ELECTRIC FURNACE FOR STEEL FOUNDRY USE

electrodes are usually the cheapest to use. With the single-phase furnaces, graphite electrodes are the more economical, in spite of their higher first cost.

With the one-electrode furnace the current passes in through the electrode, jumps in an arc to the bath of metal and passes out through a contact in electrical connection with the bath. In a three-electrode furnace the current passes in through each electrode and out through the other two, jumping from each electrode in an arc to the metal bath. In this case the current passes through two arcs in series.

Refractories

Most of the refractory wear in an electric furnace is on the roof. The sides are banked up with relatively cheap material that keeps the walls from wearing. This roof wear is

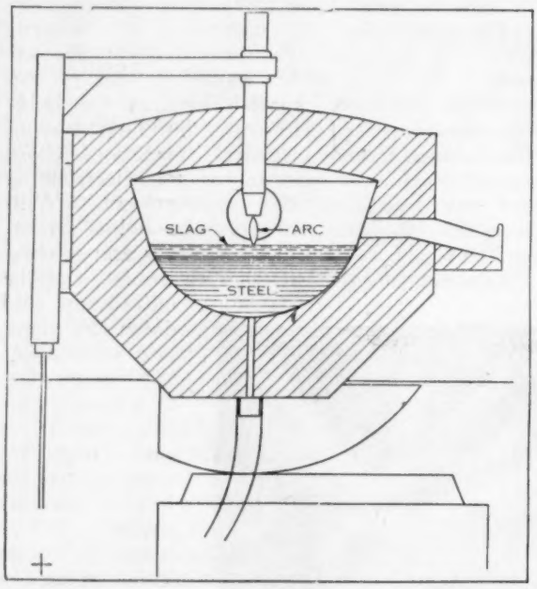


FIG. 8—ONE ELECTRODE TYPE STEEL FURNACE

largely around the electrodes and is partly due to the hot gases that escape between the electrode and the roof. With three electrodes this wear of the roof near the electrode would be expected to be three times as large with a three-electrode furnace as with a one-electrode furnace.

Part of the electrode wear in an arc furnace is due to the carbon that is vaporized to help form the arc. This is only a small part of the total loss. Most of the electrode consumption, 90 per cent of it, is due to surface burning. The electrodes burn in the gases in the furnace. This burning is proportional to the surface exposed.

The practical potential between electrode and bath is 75 volts in the three-electrode furnace and 150 volts in the one-electrode furnace. A part of this potential, in each case about 33 volts, is used in heating the terminals of the arc to produce the necessary vapor to carry the arc. The remainder of the voltage carries the current across the arc. The length of the arc is proportional to this remaining voltage.

The temperature of the lining of a furnace is determined, not by the temperature of the source from which the heat is received, but by the amount of heat that reaches the lining. The temperature to which the lining goes is that which is necessary to enable the lining to get rid of the heat which it receives. A furnace lining loses heat in two ways. Part of the heat leaks through the lining and is lost outside the furnace. The rest of the heat is radiated by the lining onto the bath. The bath is the only thing in the furnace that is cooler than the lining. In a well-built furnace, the amount of heat that leaks through the lining is only a small fraction, less than 5 per cent, of the heat that is radiated to the bath. In all arc furnaces about half of the energy absorbed reaches the lining and is radiated to the bath.

The variations in current in an electric furnace are due to changes in conditions in the furnace. In a melting furnace the gases given off by the metal cause the slag to swell up in bubbles. In practice these slag bubbles raise up an inch or so.

Electric Power

Electric power is produced and sold in three forms, direct current, alternating current single phase, and alternating current three phase. This latter is an interlinked connection of three single phase circuits. In steel-melting only the heat energy of the electricity is used. No electrolytic action is required. Therefore either of these forms of electric power may be used for steel-melting.

In the usual commercial operation it is generally inconvenient to secure enough direct current, so practically all electric steel furnaces use alternating current either three-phase or single-phase. The amount of power used by a steel furnace is larger than the usual size of motor. The alternating current makes it practical to bring this larger power to the furnace at a high pressure over a small wire and change it to the low pressure used in the furnace by means of transformers at the furnace. This saves the heavy investment in large copper cables that would be necessary if the power were brought as low pressure current all the way from the generating station. Alternating current is also more convenient to control and measure than direct current.

Three-phase alternating current costs 5 per cent less to generate and transmit than single-phase current. This is due to the fact that smaller generators and wires can be used with three-phase current. On account of this saving, it is usual to generate and transmit practically all electric power in three-phase form, and, if required, change the three-phase to

single-phase or direct current near the place where the current is to be utilized.

Three-phase current is an interlinking of three single-phase currents. These can be separated and each used in a single-phase steel furnace. To use the three-phase current directly in a steel furnace requires three electrodes.

Materials of Charge

Steel is made from pig iron, ore and scrap. The proportions can be varied, but some of each or an equivalent is used in all steel-making. The pig iron supplies carbon. Cast iron scrap or carbon in the form of charcoal can be substituted for the pig iron. The ore furnishes oxygen. Mill scale or a blast of air can be used as an alternative supply of oxygen. Steel scrap is practically always added to the charge. The reason is that steel scrap is almost always the cheapest material to make steel out of. The more scrap in a charge, the cheaper the steel will be.

This is especially true in an electric furnace, as the electric furnace can readily melt steel scrap in mechanical forms that would work badly in other steel furnaces, such as borings and turnings. The electric furnace atmosphere can be made non-oxidizing, so that such small-sized material is not burned and lost in the slag. Ore is the most expensive material for steel-making. Not only does the ore cost more per pound of contained iron than steel scrap can be had for electric steel-making, but there is required per pound of steel three times as much electricity to make steel from ore as from scrap.

The materials charged carry with them into the electric furnace various forms of dirt. The refractory linings of the furnace melt and drip into the charge. Some constituents of the metal, silicon and manganese, combine with oxygen, sulphur and phosphorus and make compounds that are not readily soluble in the metal bath. All of these combine to form a slag. This slag of itself is usually too thin or too thick. To bring it to the proper mechanical consistency fluxes are added, either silica or lime, and usually in powdered or granular form. The amount is relatively small, the total slag generally weighing less than 20 per cent of the weight of the metal.

Alloys are added to electric steel for two different purposes. Sometimes the same alloy addition acts for both purposes. The first is to deoxidize the steel. In this case the alloy is itself oxidized and floats up and dissolves in the slag. The other purpose is to improve the physical characteristics of the finished steel. In this case the alloy dissolves in the metal. Nickel steel is such a material.

Mechanically an electric steel furnace is operated the same as an open-hearth furnace. As the electric furnace runs faster, the furnaces are smaller in holding capacity for a given tonnage output. For this reason hand charging is the rule with electric furnaces.

Chemically an electric steel furnace is the same as an open-hearth, with the exception that the oxidizing influences of the gas flame are absent. The carbon in an electric steel heat will run down slowly if the furnace is allowed to stand. No carbon is absorbed from the electrode, unless the latter is purposely forced into the bath to recarbonize the steel.

In charging scrap, the customary way is to charge the heavy pieces first with the light scrap on top. After the bath has melted down, the flux is added. The charge boils as in an open-hearth. When the steel is finished, test bars are poured and the carbon determined by the fracture. The quality of the steel can be determined by the thickness of the edge of the stream when the test flows from the spoon into the mold. It is also shown by the color of the slag. A steel properly killed has a light green slag.

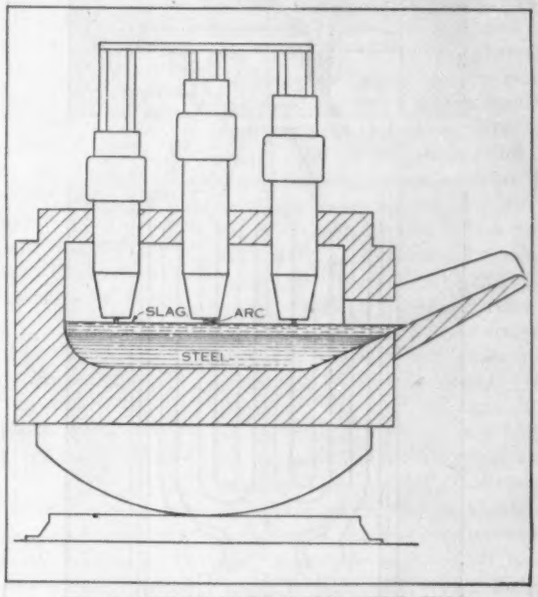


FIG. 9—THREE ELECTRODE TYPE STEEL FURNACE

Whether the steel is to be refined or not, is determined by commercial conditions. The electric furnace has greater steel refining powers than any other form of steel furnace. Refining costs less per unit of impurity removed and can be carried further. This is the direct result of the higher temperatures practical in an electric furnace. Such refining raises the cost of the steel. It takes more furnace time and this increases the cost per ton for labor, power, electrodes and refractories. The refining takes more flux and more alloys.

Under the average commercial conditions in the United States, it usually pays better to buy cleaner scrap and do less refining. To do any considerable amount of refining requires a basic lining, although some refining can be

done with an acid lining. A properly arranged electric steel furnace can be readily changed from acid to basic lining or back again. It takes about three days to make the change. Usually a Sunday is included as one of the days. The furnace can thus be kept lined to correspond with the best commercial condition of the scrap market.

In an arc furnace the slag is hotter than the metal. In an induction furnace the metal is hotter than the slag. In refining, the phosphorus and sulphur tend to go more strongly from the cold metal to the hot slag than they tend to go from hot metal to colder slag. This

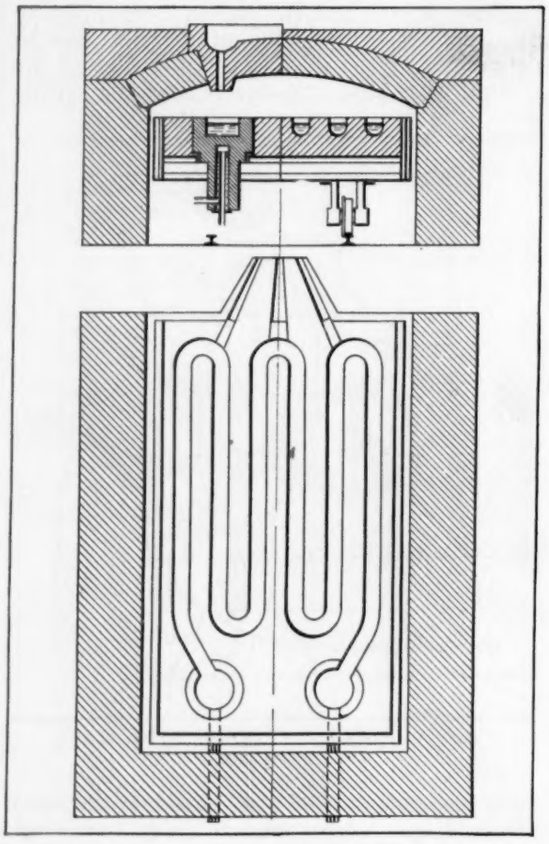


FIG. 10—GIN TYPE FURNACE WITH LIQUID RESISTANCE

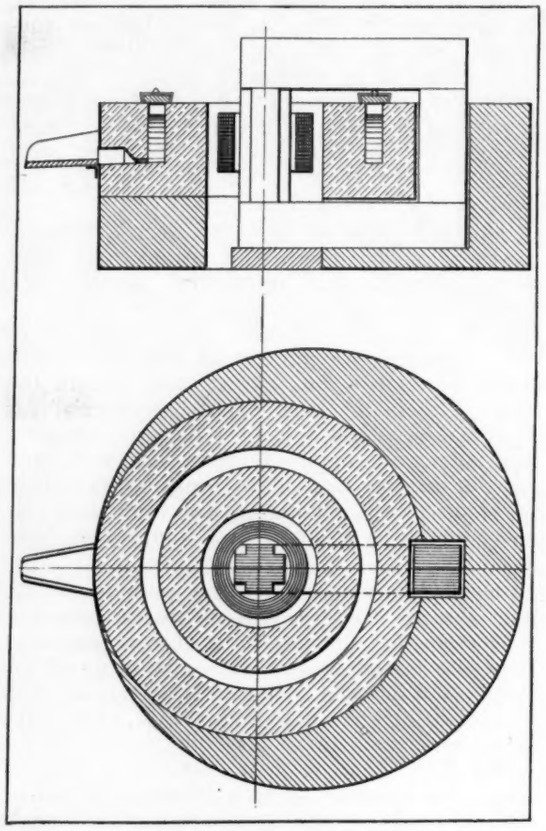


FIG. 11—ORIGINAL FORM OF KJELLEN STEEL FURNACE

can be overcome by using a larger amount of slag and one more basic in character. The extra flux required is why refining costs more in an induction furnace per unit of impurities removed, than in an arc furnace, as this extra flux has to be paid for as well as the electric power to melt the flux.

Quality of Electric Steel

It is generally recognized that the quality of the electric steel in the market is higher than the usual fuel-melted steel. This is due to the fact that good quality can be reached at lower cost in an electric furnace than in fuel furnaces. Practically any quality of steel produced in an electric furnace can also be made in either an open-hearth or a crucible furnace, but the higher the quality of the steel the higher will be the excess cost of fuel melting over electric melting.

There are scientific reasons for believing that the passage of the electric current through the molten steel should increase the strength and density of the steel. Electric steel actually has a higher tensile strength and a higher density than fuel-melted steel for the same analysis. This is in part due to the greater freedom from gases and slag. Not enough scientific work has been done to reliably determine what part of the remainder is due to the magnetizing effect of the current, in the types of furnaces where the current flows through the metal.

The passage of the current through the bath sets up movements in the metal which serve to mix the metal and make it more uniform. These movements are readily seen by watching an unmelted piece of iron swim around in the bath. Another quality which is well recognized, but which has had no definite explanation, is high elastic limit of electric steel. That is, the yield point is much nearer the ultimate strength in electric steel than in fuel steel. This with

(*Continued on page* 1154b)

The Measurement of Efficiency

Ratio of "Productive" to "Non-Productive" Labor Not a Measure of Efficiency—Relationship of Wages and Costs Pointed Out

BY H L GANTT

THE widespread interest in the subject of management which has grown up within the last few years, has, I believe, a deeper significance than is at first realized. The readiness with which employers of labor have been willing to seek advice from almost anybody calling himself an "efficiency engineer" is hard to understand on any theory except that many employers realize that they are not operating their plants as well as they should be operated; and the fact that so many so-called "efficiency engineers" with but little experience or training have been able to accomplish results apparently well worth while, seems to bear out the theory that the art of management as practiced by many employers is still in a very crude state.

To be sure, many "efficiency engineers" have become discredited and gone out of business, but others have entered the field, and apparently the number in active practice is greater today than ever before. It would be impossible for such a large body of men to find employment unless at least a fair number of them were doing some good. Certainly the continual call for efficiency has made many employers study their problems in a way they have never done before.

To the engineer the word "efficiency" has a definite meaning, which may be expressed approximately as the ratio of the useful result produced to the effort utilized in producing it. To the public in general it means simply doing things better.

It is very unfortunate that the term "efficiency engineer" was ever invented, for every engineer is engaged in the work of promoting efficiency, and it seems presumptuous for any class of engineers to arrogate to themselves a title which implies that they are preeminently promoters of efficiency. A more correct appellation would be "management" or "industrial" engineers.

Waiving the subject of name, however, it is certainly a fact that the agitation of the subject of management and efficiency during the past few years has caused many employers to study their management problems very much more closely than heretofore, with the result that there has undoubtedly been a marked improvement in the efficiency with which industrial operations as a whole are being conducted.

So far so good. But in spite of this increase in efficiency, the greatest of our industrial problems, the relation between the employer and the employe, seems but little nearer solution. While there has been a distinct improvement in isolated cases, these cases are few compared with the total number, many of which show no improvement whatever.

It is safe to say then, that the promotion of efficiency is not alone sufficient to serve the needs of a nation that aspires to be a leader in industrialism. As a matter of fact one of the most efficiently run plants I have ever seen promises, unless my theories are all wrong, to widen the gap between employer and employe. The solution lies deeper, and before we can make any real progress toward it, we must revise some of our fundamental conceptions.

With the growth of competition within the last 20 years the necessity for some knowledge of costs became evident, and the manufacturer turned to the accountant for a system of finding costs.

The present system of railroad accounting had been developed, and certain ratios accepted as measures of efficiency of operation; notably among them the ratio of operating expense to total income. Being accustomed to having the managerial efficiency of railroads expressed by a simple ratio, the financier demanded a similar simple measure of the efficiency for an industrial plant. The cost accountant promptly gave him what he called the ratio of "non-productive" to "productive" labor, which he said should be low for good management. By "non-productive" labor he meant salaries of all kinds, and all other labor that could not be charged directly to an order, including miscellaneous labor such as watchmen, sweepers, truckmen, etc. By "productive" labor was meant simply that labor which could be charged directly to an order.

While the ratio of operating expense to total income may be a fair measure of efficiency in a transportation company, the ratio of "non-productive" to "productive" labor is not only not a fair measure of the efficiency of operation in a manufacturing plant, but is often exactly the reverse.

To my mind the widespread use of this ratio as a measure of efficiency, has been more effective in producing inefficiency than any other single factor, except the oft-repeated statement that you must have low wages if you would have low costs. Until these two fallacies are absolutely discredited, we cannot expect a solution of our most serious problems.

Of these two fallacies, the second, namely, that you cannot have high wages and low costs, seems to be yielding gradually to the overwhelming mass of evidence against it. So many cases are now on record where the industrial engineer has increased output, raised wages, and at the same time lowered costs, that only those who are too conservative to investigate are still holding on to the old theory. Better still, many employers have shown the courage of their convictions by adopting a scheme of management for the increase of output and the reduction of costs, which they are perfectly well aware will make a decided increase in wages. With evidence of this kind at hand, it is safe to say that this fallacy will before long be entirely discredited. On the other hand it must be fully understood that something more than a simple increase in wages is necessary to increase output, and if nothing is done but to increase wages we are sure to get higher costs.

The other fallacy, that the ratio of "non-productive" to "productive" labor is a gage of efficiency, is so firmly rooted, however, that it is hardly to be expected that it will yield in the near future.

In considering this subject I wish to cal attention first to the terms "productive" and "non-productive" labor, which seem to me to be misleading. If any expense is "non-productive" namely, does not contribute to the end for which the factory was established, it should be eliminated. The salaries of the officers, foremen, janitors, truckmen, and laborers, as well as the money paid for taxes, insurance, or interest are necessary to the operation of the factory and therefore productive. They are, however, not chargeable usually to any specific order, but must be distributed over all the work done according to some definite rule. I prefer to call all such expenses that have to be

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distributed "indirect" expenses, and those that are chargeable to specific orders "direct" expenses. The ratio which we have in mind is thus more correctly described as that of "indirect" to "direct" labor. This, however, is a matter of names and does not affect the fact that to base any conclusions as to the efficiency with which factory is run on this ratio is misleading, and to attempt to use it as the gage in operating a factory may be, and often is, productive of inefficiency rather than efficiency.

This fact can best be made clear by a series of examples. In a factory where this ratio was used as a guide the following incident occurred: A foreman had ten men on a job, which he said could be done by eight if he could have a boy to supply them with work. He said, however, that if he made the change, the boy's wages would be called "non-productive" labor and his ratio would go up, with the result that he would be criticized, so he did not make it.

In the U. S. Navy an energetic officer studied the loading of ammunition and very much reduced the direct labor employed, but, being unable to reduce the indirect labor in the same proportion, the above ratio went up. He came in for very severe criticism, notwithstanding the fact that his total labor had been decidedly reduced. I might give numerous examples of this kind, including one where two men took the place of 16, and a daily direct wage of $8 took the place of $48, with but little increase of the corresponding indirect expense. The result of this and other changes was that the ratio for that shop became over double its former value, with a marked reduction in the total cost. Needless to say, that the ratio theory in that plant is not regarded with the same reverence that it once was. In plants where such results have been accomplished, those who have been accustomed to worshipping this ratio, at once demand another idol in place of the one that has been so badly discredited.

Inasmuch, however, as the efficiency of the operation of a factory is made up of the efficiency of a great many independent operations, and is really indicated only by the cost of the various articles produced, there has not yet been found any easy way of indicating the efficiency without first getting the cost of the individual articles. Hence there is no readily available idol that can be substituted for the discredited one. Having been accustomed to an idol, however, both the accountant and the financier demand one, and are loathe to give up the idol they have so long worshipped no matter how badly shattered it may be. When, however, a reliable cost system has been installed, this idol becomes so badly discredited that even its most devoted high priests are obliged to abandon it.

In speaking of the cost systems, we must discriminate between cost systems and expense systems. Before we can get correct costs we must have a correct knowledge in detail of all the expenses of a plant, and some idea of how to combine these to get costs. In discussing this subject, I wish to avoid the controversy as to the proper method of distribution of indirect labor and indirect expense and to confine myself to the problem of how to get a true knowledge of the various items of labor and expense, both direct and indirect. This subject seems to have been given but scant consideration by the average accountant, who has usually assumed this to be easy and devoted his energies to working out elaborate theories as to what should be done with the various items of expense. Inasmuch as I find that the information which the office gets of what the shop has done is, as a rule, not very reliable, I feel that it is far more important to get this information correct than to get up elaborate schemes for using it.

Everybody is agreed that all expense of material or labor that can be readily charged to an order should be so charged, but whether the indirect labor and expense should be charged in proportion to direct labor or machine hours, and how other items of rent, taxes, insurance, etc., should be distributed, are questions which it seems to me should be largely determined in each case on its merits. I have never yet seen any general scheme that seems to suit all cases.

We shall therefore confine ourselves to the consideration of what the essential elements of a reliable cost system are, and how to get an exact knowledge of them. These elements are a knowledge each day of

(*a*) what was done the day before
(*b*) who did it, and
(*c*) what was paid for it.

It is necessary to check these items daily, for it is impossible to check them accurately after the lapse of any appreciable time.

It is comparatively easy to get a set of returns purporting to give the above information, but the real difficulty comes in knowing whether these returns are correct or not. The only sure way of knowing whether these returns are correct or not is to know beforehand

(*a*) what should be done the next day
(*b*) who should do it, and
(*c*) what should be paid for it.

When we have arrived at a condition under which we can plan our work in advance on these lines, we have the basis of a real system of management, in which we can promptly check what has been done with what should have been done, and know with certainty each day how we stand.

It is not my intention to go into details as to how this can be done, as the subject is too big for a paper of this character. However, as the criticism

Pertinent Hints

It is safe to say then, that the promotion of efficiency is not alone sufficient to serve the needs of a nation that aspires to be a leader in industrialism. As a matter of fact one of the most efficiently run plants I have ever seen promises, unless my theories are all wrong, to widen the gap between employer and employe. The solution lies deeper, and before we can make any real progress toward it, we must revise some of our fundamental conceptions.

While the ratio of operating expense to total income may be a fair measure of efficiency in a transportation company, the ratio of "non-productive" to "productive" labor is not only not a fair measure of the efficiency of operation in a manufacturing plant, but is often exactly the reverse. To my mind, the widespread use of this ratio as a measure of efficiency, has been more effective in producing inefficiency than any other single factor except the oft repeated statement that you must have low wages if you would have low costs. Until these two fallacies are absolutely discredited, we can not expect a solution of our most serious problems.

Before we can expect to get any great benefits from the newer managerial ideas, we must readjust our ideas of the functions of the cost accountant, who must become the servant of the operating executive as well as the financial executive. As long as the cost accountant is simply a critic, he may be called "non-productive," but when he furnishes the superintendent with prompt information which enables him to reduce costs he becomes "productive." Promptly detailed information of what is being done each day, furnished in such manner as to be readily compared with what has been done, and what can be done, is the best method of measuring efficiency.

will be at once raised that the clerical work needed would be so great as to make it out of the question. In reply I may say that even in the most poorly run business, some attempt, either consciously or unconsciously, is made to control the work on these lines. Moreover, we generally find that the more nearly the above ideal is approached, the more successful the plant is, and all will admit the desirability of such a system if it can be established without excessive clerical work.

When it is realized that the installation of such a system seldom results in an increase of output of less than 25 per cent, and often as much as 100 per cent, it is easy to see that the additional clerical work cuts but little figure. As a matter of fact the clerical work needed to operate the best systems of this type is decidedly less than that needed to operate any of the standard cost systems put in by chartered accountants. It must be borne in mind, however, that during the process of installing the new system and training the employes to operate under it, the old system must be continued; and not until each function performed by the old has been taken over by the new can we drop the old entirely.

During the process of installation, therefore, we must to a large extent operate two systems. This necessarily runs up the ratio of "non-productive" to "productive" expenses, and the accountant lifts up his hands in horror at the expense the new system is running them into. If at the same time the new system is successful in reducing the "productive" labor, the ratio is still higher, and the "showing" is still worse, even though the total cost is less. I therefore repeat that the first step to be taken before introduciing a modern system of management is to eliminate the ratio of "non-productive" to "productive" labor as a measure of efficiency. The elimination of this ratio as a measure, and the establishment of the fact that total cost is the only reliable guide, will do much to pave the way for an improved system of management How is this to be accomplished?

The first step is to revise our ideas as to the functions of a cost system. In the past the principal function of a cost system, besides indicating a limiting selling price, has been to enable those in financial control to criticize those operating the factory. These criticisms are usually from one to three months late, and are so general in their character as to afford, as a rule, no guide whatever by which the superintendent can be governed. Such a system is too often most highly prized for its worst defect, namely, that it enables those in financial authority to criticize without taking any responsibility whatever for showing how to do better. If, instead of making the function just described the prime one, we raise to equality with it, a function which requires the system to furnish promptly, day by day if necessary, exact information of what has been done and what the expenditure has been, we shall find that its most valuable function becomes, not finding costs, but furnishing the superintendent with information which helps him to reduce costs.

In other words, before we can expect to get any great benefits from the newer managerial ideas, we must readjust our ideas of the functions of the cost accountant, who must become the servant of the operating executive as well as of the financial executive. As long as the cost accountant is simply a critic, he may be called "non-productive," but when he furnished the superintendent with prompt information which enables him to reduce costs he becomes "productive." Promptly detailed information of what is being done each day, furnished in such manner as to be readily compared with what has been done, and what can be done, is the best method of measuring efficiency.

Pumps on Movable Trucks

The Ashland Iron & Mining Co. and the Ashland Steel Co., Ashland, Ky., are using interesting installations of steam and electric driven pumps for pumping water from the Ohio river. The pumps are mounted on trucks which run on tracks laid on the river bank and in this manner are accommodated to the fluctuations in the stage of the river.

The Ashland Iron & Mining Co. has installed three turbine driven pumps, similar to that shown in Fig. 2. Two of them have a capacity of 3,000 gallons of water per 24 hours against a total head of 150 feet, and the third has a capacity of 4,200 gallons of water per minute against a total head of 75 feet. The turbines which are of the De Laval type are rated at 125 horsepower each.

The equipment employed by the Ashland Steel Co. includes three motor-driven pumps designed for a capacity of 1,900 gallons of water per minute against a total head of 80 feet. The motors are rated at 60 horsepower and operate at 1,700 revolutions per minute on 220-volt direct current. The pumps, in the case of the Ashland Iron & Mining Co., are 10-inch, single stage, operating at 2,300 revolutions per minute, and those operated by the Ashland Steel Co. are 8-inch single stage. The equipment was furnished by the Dravo-Doyle Co., Pittsburgh.

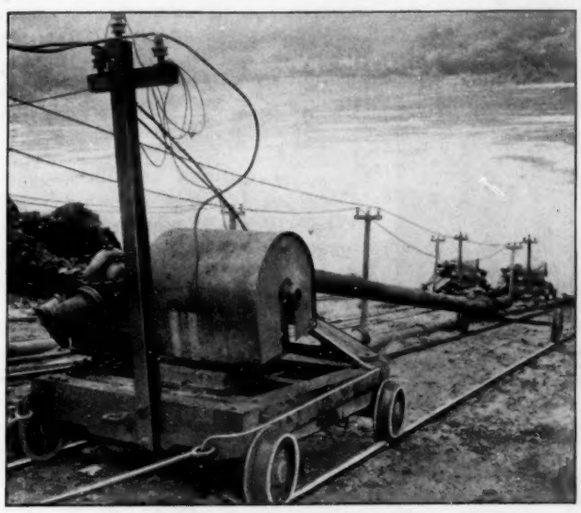


FIG. 1—ELECTRIC DRIVEN PUMPING UNIT AT PLANT OF ASHLAND STEEL CO.

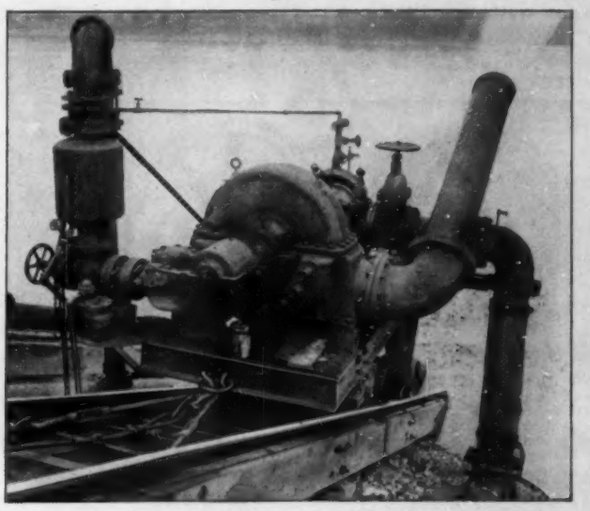


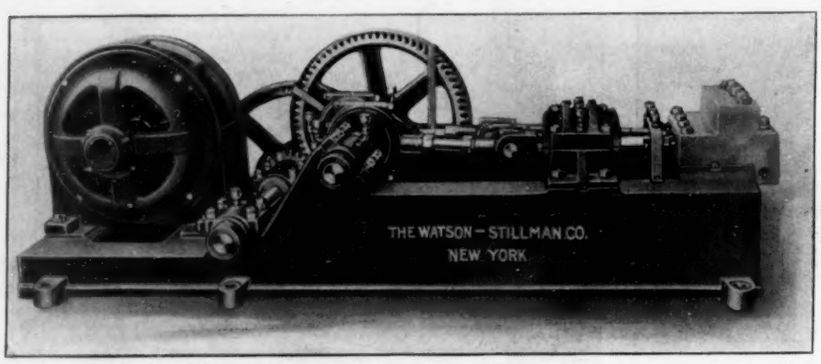
FIG. 2—TURBINE DRIVEN PUMP MOUNTED ON MOVABLE TRUCK

Triplex Hydraulic Pump

The Watson Stillman Co., 50 Church street, New York, has added to its line of high pressure hydraulic pumps, a new type of motor driven geared triplex single acting pump, which embodies some features of interest. While primarily designed for tunnel service, it can meet other conditions.

To secure rigidity, and to insure perfect alignment of all the working parts when under severe service, the motor is mounted on an extension of a heavy cast iron base. The driving shaft and bearings are large. The gears are heavy cut-tooth type. The pump is driven from the shaft by eccentrics. The plungers are of tool steel and are guided in a rigid crosshead guide, which is keyed and bolted to the base.

The pump body is equipped with bronze valves and bonnets. The passageways are made large in order to reduce friction of the water to a minimum. The pump shown in the accompanying illustration is operated by a 10 horsepower motor, running at 600 revolutions per minute and delivers 100 cubic inches per minute at 3500 pounds pressure, with a speed of the crank shaft of 100 revolutions per minute.



TRIPLEX HYDRAULIC PUMP

The Cleveland Electric Motor Co., 5518 Euclid avenue, Cleveland, has made an agreement with The Erner Electric Co., Cleveland, to co-operate with the latter in the sales of Allis-Chalmer motors in the Cleveland district. Equipment has been provided to take care of repairs and installation work.

In a four-page circular, issued by the National Tube Co., Pittsburgh, the Kewanee union is illustrated and described. It is claimed that by its use the following savings are affected: One nipple, the time required for making one less joint, one gasket, the time required for cutting and fitting this gasket and the cost of one malleable union. This net saving is claimed to amount to 16 cents. The circular shows both male patterns and contains a well-prepared description of this type of equipment.

Steel Truck

The Edwards Mfg. Co., Cincinnati, has designed a steel truck for use in shops, foundries, warehouses and other places where an extra heavy general purpose truck is desirable. The frame, which is continuous, is made of 2½-inch angle bars. The joints are riveted throughout, except that bolts are used on the wooden handles to facilitate their removal. The wheels are placed within the body line and the truck may be maneuvered in minimum space. Its weight is about 120 pounds. The wheels are 11 inches in diameter with 2¾-inch faces. The truck is 62 inches in length and 24 inches in width.

Heat Treated Gearing

A paper prepared by W. H. Phillips, metallurgist, R. D. Nuttall Co., Pittsburgh, on "Recent Developments in the Heat Treatment of Railway Gearing", was read Dec. 1 by T. D. Lynch, of the Westinghouse Electric & Mfg. Co., before the mechanical section of the Engineers' Society of Western Pennsylvania. Mr. Phillips was unable to present the paper because of illness.

After describing the heat treatment of steel during the first years of its history, Mr. Phillips spoke of the progress made in the last 10 years, concluding his introductory remarks by predicting that the future gear steel will be an alloy steel. The evolution of the railway motor gear was outlined in an interesting manner. The first railway motor gear of commercial value was made of cast iron, and a short time later malleable cast iron gears were introduced. The iron gear was succeeded by a four-spoke cast steel gear, which was greatly improved by the introduction of the process of heat-treating. This particular gear was treated by oil-quenching and case-hardening processes. The four-spoke gear was succeeded by a six-spoke cast steel gear.

The next and most radical step in the design of gears was the introduction of the forged blank. "There are two methods of manufacturing the forged blank, by rolling and by hammering and rolling", Mr. Phillips explained in his paper. In the former process the ingot is heated and rolled into a round about 12 inches to 18 inches in diameter and then cut into discs ranging from 6 to 10 inches in thickness. The discs are re-heated before being finished. Hammered and rolled gear blanks are cast from individual ingots which are hammered into flat discs of required sizes. The rim is worked out between a set of rolls compressing the disc on all sides. Mr. Phillips' paper briefly described the flexible gear, employed for heavy duty railway service.

Method of Heat Treating

"One of the first essentials in the heat treatment of steel is to know the composition of the steel to be treated; it should be purchased on chemical analysis and check analysis of every heat carefully made before treating", the paper pointed out. "Steel when at a temperature about the critical range is a solid solution of carbon in iron or austenite, and when quenched from this temperature the result is some form of solid solution of ferrite and cementite, or carbon, depending upon the rapidity of the cooling which in turn is controlled by the cooling bath," Mr. Phillips said.

The general methods of heat-treatment of steel are the same for different grades of steel and the sequence of operations is as follows: Anneal, quench and draw. Annealing, the author of the paper said, is provided before machining to eliminate casting or forging strains and to facilitate machining. The gear is transferred quickly from the annealing furnace to the quenching bath to minimize the loss in heat. The quench is made in such a manner as to allow the greatest surface of the gear to come in contact with the bath at the same time. The last operation in the heat-treatment of steel is the draw-back or tempering, which may be accomplished in a furnace or in hot oil. The oil bath should be used, it was suggested, for drawing at low temperatures, and the furnace for drawing at high temperatures.

Compact, Standard First Aid Jar

Details of an Outfit Developed by the National Affiliated Safety Organizations for Use in Mills and Factories

BY MAGNUS W ALEXANDER

HUMANITARIAN as well as economic considerations demand of each employer, and for that matter of every one in his employ, persistent effort for the prevention of accidents and of injuries to persons. To accomplish this purpose is the finest work that can be done in the field of safety and sanitation. It is clear, nevertheless, that absolute immunity from all accidental injuries cannot be expected; it is therefore of next importance to eliminate or promptly check the harmful results of such injuries as do occur, in order that injured persons may not be kept unnecessarily from their daily work nor suffer any permanent physical impairment or disfigurement.

Injuries to persons may be due to accidents such as the breaking of a machine or a tool, the spattering of molten metal or the flying of chips, or they may result from unsanitary or injurious conditions such as are caused by smoke or poisonous vapors; persons may suffer temporary disability from physical weakness or from unavoidable conditions of employment, and quite often, inexcusable carelessness of the employe may be the cause of the injury. Whatever the cause, it is obvious that an injured person should receive prompt and effective attention, sometimes to prevent graver consequences such as blood poisoning, and sometimes to save even life itself, as when the injured person bleeds excessively.

FIG. 1 — THE JAR WEIGHS ONLY 12 POUNDS AND MAY BE CARRIED EASILY

If a physician or a professionally trained nurse is close at hand, it is of course safest to turn the injured over to his or her care; in most instances, however, such is not the case. Even where doctors and nurses are regularly employed in industrial plants or are located nearby, they may be engaged upon other equally serious cases or may be temporarily absent when they are urgently needed. Often also the nature of the injury, such as severe bleeding or unconsciousness from electrical shock, demands effective treatment without the waste of a single minute, when the time lost in taking the patient to the doctor or in bringing the doctor to the patient might prove fatal. Then there are the thousands of slight injuries like cuts of the hands or irritations of the eyes, when

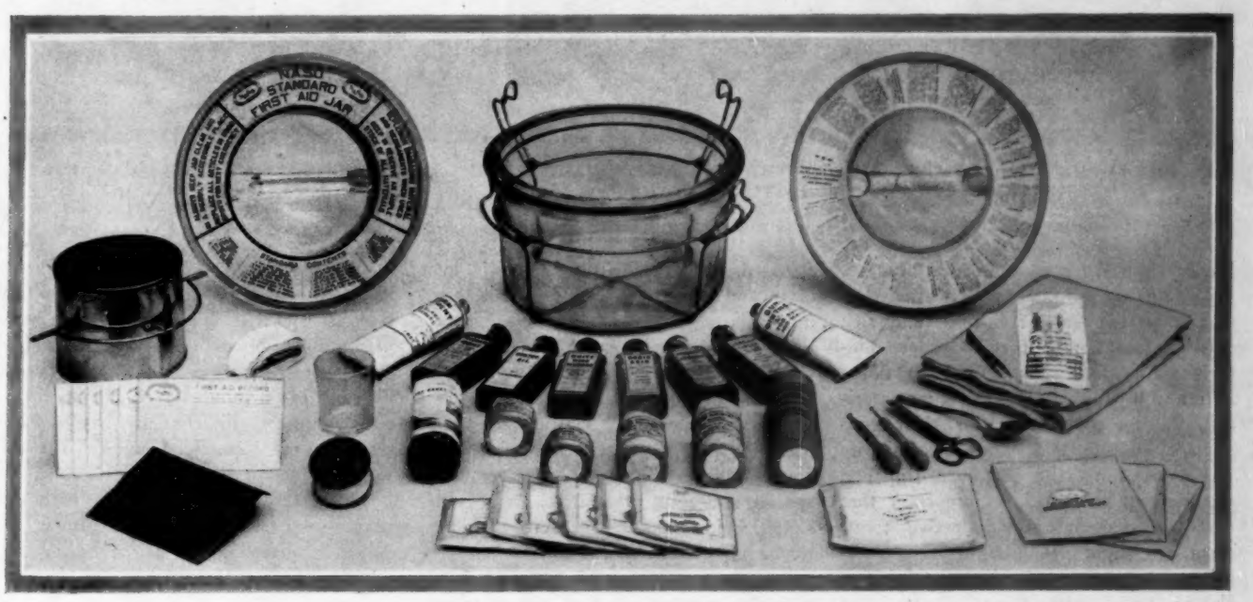


FIG. 2—N. A. S. O. STANDARD FIRST AID JAR AND CONTENTS
(Illustration shows both sides of Jar Cover)

1 Tourniquet
1 pair nickel-plated scissors
1 pair nickel-plated tweezers
1 triangular sling
1 wire gauze splint
12 assorted safety pins
1 2-ounce bottle Castor oil
1 2-ounce bottle 3 per cent alcoholic iodine
2 3-ounce tubes burn ointment
1 2-ounce bottle white wine vinegar
1 2-ounce bottle 4 per cent aqueous boric acid
1 2-ounce bottle aromatic spirit of ammonia
1 2-ounce bottle Jamaica ginger (or substitute)
1 piece of flannel 24 x 36 inches.
1 roll absorbent cotten (1.5 ounces)
1 roll 3-inch x 10 yards gauze bandage
1 roll 2-inch x 10-yard gauze bandage
2 rolls 1-inch x 10-yard gauze bandage
1 spool 1-inch x 5-yard adhesive plaster
6 packages 6 x 36-inch sterile gauze
1 teaspoon
1 metal cup
1 medicine glass
2 medicine droppers
3 paper drinking cups
First aid record cards

the injured persons will not take the time nor trouble to go to the dispensary in the plant or to a doctor nearby, but will use unsafe methods of self-treatment, or will secure similarly harmful attention from co-worker, who is as incompetent as himself to properly attend to the injury. For all of these reasons, it is becoming quite universally agreed that selected persons in employment—usually the superintendent and some foremen, clerks or store-keepers—should be taught proper first aid treatment of injured or sick persons. Where it can readily be done and particularly in large establishments or where there is an unusual risk in the employment, the first aid instruction should be given by a competent physician and should be repeated periodically so as to keep the first aid workers in needed practice. To train men in proper methods of first aid treatment of injured and sick persons, and not to furnish proper materials for this work would be doing half a job only; to furnish the materials and not to provide for their convenient storage and ready accessibility would be doing the job in a slip-shod manner. It is therefore important that first aid materials for effective treatment of slight wounds, or for emergency treatment of serious injuries, should be furnished and kept in a suitable container in which they can be readily carried. Such first aid outfits, in one form or another, are now in quite general use in industrial establishments in stores and offices, in schools and even in homes.

For some first aid outfits, wooden or tin boxes are used as receptacles for the materials. Wooden boxes usually are heavy and are inconvenient to carry; tin boxes are lighter in weight but are easily dented and are apt to rust. Both are open to the complaint that it is difficult to keep them clean and in good order. These outfits have the added disadvantage that their entire contents, which cannot be seen at a glance, may have to be disarranged to get at a particular article which may be at the bottom of the box.

Use of Glass Jars

In order to provide a more sanitary equipment, glass jars have come into use as containers for first aid materials. Their advantages over wooden or tin boxes are obvious. If properly constructed, such outfits can be easily kept clean and quick access can be had to all materials.

The National Affiliated Safety Organizations' standard first aid jar was developed to meet all requirements of a compact, convenient, sanitary first aid outfit. The jar itself is structurally strong and is made yet stronger by a special annealing treatment. It was designed with smooth surfaces and particularly with straight walls on the inside to promote cleanliness and facilitate the removal of first aid materials. In the glass cover of the jar is molded a convenient carrying handle and the cover is securely held on the jar by suitable spring clips which are a part of a metal cage in which the whole jar sets; this metal cage affords added protection against breakage of the jar. A rubber gasket between the jar and the cover makes the outfit dust-proof and equalizes strains in the cover. The jar is made only high enough to accommodate the bottles of medicaments stored in it so that the stoppers cannot come out of the bottles when the cover rests on the jar. Medicine bottles, bandages, absorbent cotton, burn ointment in collapsible tubes and a wire gauze splint are set along the wall of the jar so that they are plainly visible from the outside and can be quickly located. A metal dish of special construction, placed in the inside of the jar, keeps the materials just mentioned in their proper place. The metal dish itself is used as a receptacle for other parts of the contents, such as tourniquet, medicine glass, gauze bandages, medicine droppers, spoon, scissors, etc. A glance at the accompanying illustrations and list will show that a surprisingly large number of articles are stored in the jar, which is only about 9½ inches in diameter, 6 inches high, and complete with contents weighs only slighly more than 12 pounds. Yet the jar includes every material, which a large conference of physicians, with extensive experience in the treatment of injuries, agreed upon as necessary for effective first aid treatment by laymen.

Even a splint is stored in the jar and for this purpose a strip of flexible wire gauze 30 inches long and 4½ inches wide is used, wound into a small roll. This can easily be cut to the required length and can be shaped snugly around the broken limb; when held

(*Continued on page* 1143.)

FIG. 3—THE ARRANGEMENT ALLOWS THE QUICK REMOVAL OF ANY ARTICLE WITHOUT DISTURBING THE OTHERS

FIG. 4—FOR TRANSPORTING ON MOTOR TRUCKS OR SHIPPING, THE JAR IS PACKED IN WOODEN BOX

Galvanizing Malleable Castings

Valuable Suggestions Covering Methods to be Followed in Cleaning, Pickling and Coating Malleable

BY ENRIQUE TOUCEDA

WHEN two metals are placed in close contact with each other, a slight galvanic action is set up, and if they are exposed to moisture rusting is facilitated. Zinc, however, being electropositive, will oxidize at the expense of the iron, and consequently afford protection until it has disappeared. Zinc itself when exposed to the atmosphere corrodes with extreme slowness and this property is of great value since even with the galvanic action referred to when in contact with iron, it lasts for a long period of time. Other metals like tin or lead, due to their not being electro-positive to iron, do not act like zinc. They act simply as a covering in a similar manner to varnish or paint, though they are more resistant to destruction through outside exposure. Even if a pin hole is exposed, the iron or steel starts to rust, but in the case of the zinc-coated material this would not be the case.

In hot galvanizing the formation of zinc dross is the greatest obstacle. It is produced both by the oxidation of the zinc in the molten bath and the action of the zinc on the iron of the kettle. Zinc will absorb from 1 to 4 per cent of iron, and it happens that as each per cent is absorbed the melting point of the bath is raised, the zinc thus becoming thick and pasty, making it necessary to skim at frequent intervals. Therefore, it should be specified that spelter for use in galvanizing should contain less than 0.50 per cent iron, a provision that can be easily met by the vendor.

The best material out of which to make the galvanizing kettles is fire box steel, and even for small work the vessel should not be less than 3 feet long, 18 inches wide and 20 inches deep, for with a smaller body of metal it is difficult to control the temperature. It should be located in a room where there is good roof ventilation. A hood should be built over the kettle that will come down as low as practical, and of sufficient size to extend about 2 feet beyond the brick work around the kettle. As considerable water is used in the process, provision should be made for proper drainage, and it is well to have a cement floor with gutters at each side.

In firing up, the spelter should be placed in the kettle in such a way that it will lie as closely as possible to the sides of the kettle, and be so arranged that as the outside slabs of spelter melt, those next to them will be forced against the sides of the kettle. If this is not done the life of the kettle will be shortened. The fire should be prevented at any time from rising any higher than the surface of the bath that is being formed as the metal melts.

Before dipping the work, cover the surface of the molten zinc with a flux of sal-ammoniac, and if trouble is experienced due to an inconvenient separation of the dross, add a few drops of glycerine, which will cause the flux to thicken up and prevent it in a measure from covering the whole surface. It also causes the flux to remain stationary so that when the operator is ready to draw the article from the bath, the flux will not cover the spot he has skimmed for this purpose. The sal-ammoniac not only serves to prevent the zinc from oxidizing, but assists the iron to take the zinc quickly and evenly. A small amount of the sal-ammoniac sprinkled on the surface of the bath frequently, is much better practice than a greater amount at longer intervals.

The temperature of the bath may vary from 800 to 1,000 degrees Fahr., depending upon the character of the work to be galvanized, for which reason a pyrometer should be installed in the bath at the end of the tank so that control can be assured.

For large gray iron or malleable castings, the temperature should be as low as possible, that is, well within 800 degrees; this temperature is likewise suitable for very thin work where it is desired that the surface be highly spangled with large crystals. The thin work referred to are articles such as thin plates of metal of any size. Very small work requires that the temperature of the bath be around 890 degrees Fahr., this includes such work as is handled in baskets or that must be strung on wires.

In connection with galvanizing malleable iron castings, the most serious trouble arises from a deterioration of the metal in the casting, resulting in the casting being brittle. Another trouble arises from failure to have the surface of the castings properly prepared to take the zinc coating, which arises not, as often thought, from failure to remove all sand, but from ignorance as to the cleaning of the surface after the application of sulphuric acid. Still another trouble results from too rough and lustreless a surface of the zinc coating.

After the castings have been soft milled, and there still remains some sand, rust or scale on their surface, they should be pickled in a bath of dilute sulphuric acid, one of acid to six of water, care being taken in preparing the solution to always pour the acid into the water, and never the water into the acid. It sometimes happens that the sulphuric acid solution leaves a slime on the surface of the metal that is more or less difficult to remove. Failure to perfectly remove this will result in bad work, as there will not be a close adherence of the coating to the surface. This trouble rarely if ever occurs if, instead of sulphuric acid, hydrofluoric acid is used, in the proportions of one of acid to 20 of water. The latter acid is highly poisonous, and should not be handled by men who have not been previously instructed in its use and in the danger of getting it on their hands when it is in concentrated form.

Sulphuric acid attacks the metal and removes the sand by virtue of its eating away the metal under the sand grains, but it is attacking the rest of the metallic surface while this is being accomplished. Hydrofluoric acid on the other hand actually dissolves the grains of sand without attacking the metal except to a very slight extent.

The usual method of handling this part of the process is not to place the castings in the bath itself, but to place them on a platform attached to the tank holding the solution, where they are wet with the solution at intervals of about an hour, the excess solution draining back into the tank. As soon as it is seen that the sand has loosened, the castings are then thoroughly washed in water. After this treatment, and for the purpose of making the metallic surface take the zinc quickly and firmly, and to remove any rust that was not removed by the sulphuric acid treatment, the castings are treated for a few moments to a

hydrochloric acid bath; one of acid to two of water. This treatment removes every trace of rust from the surface of the casting, forming a thin layer of iron chloride on it, which prevents the sensitized surface from oxidizing while drying and preparatory to dipping. After drying, the castings are ready to dip, though in some factories they are plunged into the bath before they are wholly dry.

The precaution should now be taken of dipping the castings into hot water rather than cold, as the latter treatment has the effect not only of lessening the luster of the coat and making it rough, but worse than all else that could happen, it deteriorates the metal of the casting, spoiling its ductility and toughness. In some cases the extra precaution is taken of putting a small layer of oil on the surface of the hot water, but as far as I have been able to discover, if hot water is used, and particularly if the zinc bath has not been too highly heated, no oil is needed.

I have recently made a number of experiments of heating malleable iron to certain temperatures and cooling in cold water. The change produced in the structure will form the subject of another paper. So I will simply state at this time that the changes are very marked, and that such treatment destroys both the toughness and ductility of the iron, in other words, spoils the castings. Not only must the zinc bath be kept well within the temperature necessary to just do the work and no more, but the water application must be carried out with hot water, or the result will be disastrous.

Apprentice Work in Steel Plants

BY B W GILSON

THIS subject is of vital importance to the iron and steel industry, as the future success of our plants, both as regards operation and production, depends in a large measure upon the character and ability of the men we are now training to take on as assistants and later to fill our places as we are retired. It is definitely conceded that increased training along systematized lines will completely revolutionize steel mill conditions. By having a complete educational system in each plant, wonderful results can be accomplished in increasing the efficiency of our workmen, and thereby increasing the production. At the present time there are 200 different corporations doing systematic educational work, but considered as a whole, the steel mills are low in the efficiency of their educational methods. Every apprentice, no matter in which plant he may be employed, will then receive the same education and training.

At the Ohio works, Carnegie Steel Co., Youngstown, the past year constituted the first time any attempt has been made to give the men systematic training in arithmetic and algebra, but theoretical and practical electricity classes have been taught for the past five years and have proved successful. Next year, starting in September, we expect to be much better equipped, as we will have rooms especially fitted up for class work.

The mechanical department at our plant in the spring of 1912 started an educational class with the idea in view of improving the efficiency of its men and also enabling them to qualify for the examination as stationary engineer required by the state of Ohio.

The class numbered 16 men, 11 of whom passed this examination and obtained licenses to operate stationary steam engines in Ohio. Of these 11 men, eight are still employed at our plant and are doing excellent work. During the past year two classes of 14 each have been started and two men from each class have already passed the state examination for steam engineers. To aid these men in obtaining a thorough knowledge of engines, boilers, etc., various trips are made through the plant to the different boiler houses, engines, pumps, etc., talks and explanations being given on the subject direct. A text book called "Power Catechism," has been used in the class-room work, and in addition to this they have a corliss valve model, a small duplex pump and various engine parts. These models have aided greatly in teaching the scholars valve-setting, and other points relative to steam engines which are not explained very clearly in the text book.

The general method we now use for handling apprentices in our electrical department is as follows: We employ bright looking young men, who are willing to start at 18c per hour simply to learn the business and work their way up, and as they become familiar with the different positions, they are promoted and given a new rate. For example, we first put these apprentices in the electrical line gang for about two months, then in the mill as oiler and motor inspector's helper where they become familiar with the duties of the motor inspector, acting in his place when he is off duty and receiving the regular rate of the man whose place he is taking. After becoming a regular motor inspector he is no longer classed as an apprentice.

In this present system there are many points which could be improved—however, we have found that even this much mill training together with our regular class room work has been of considerable benefit to the men themselves and also to the company, as we thus obtain a more efficient organization. In my opinion the main features that should be embodied in a universal system for apprentices in steel mills are as follows:

Each department should have a training shop and class room where instructions can be given as to the work pertaining to that particular department. A certain part of the electrical shop and machine shop in each plant should be devoted especially to the training of apprentices. The boys should be under the guidance of an all around mechanic taken from the department and chosen for his interest in young men as well as for his skill as a workman. In the class room, instructions should be provided on the company's time and should be conducted throughout the entire three years of the course. Special rooms inside the works should be fitted up with tables, desks, blackboards, etc. The boys should be given problems and explanations concerning the things with which they work every day. In connection with the character of this class-room work there are four main points which must be clearly brought out. The fundamental principles underlying the subjects must be taught. These principles can best be presented through the working of practical problems dealing with the things of the apprentice's every day life. These same problems must teach him certain facts and specific knowledge concerning the things with which he is working, such as weights, strength of material, gear speeds, pulleys, belt speeds, etc. We should also impress upon the apprentice the value of the various materials he uses in doing certain pieces of work—that is, we should teach him economy in the use of material. Every electrical apprentice should be especially instructed in the fundamentals of motor characteristics,

(*Continued on page* 1154b)

Portions of a paper read at the annual meeting of the Association of Iron and Steel Electrical Engineers, Cleveland, Sept. 14-19, 1914.

How to Make Steam From Slag

An Account of Some Exceedingly Interesting Experiments Made in England —Over 800 Pounds of Steam Available Per Ton of Slag

BY WALTER L JOHNSON

FOR many years past efforts have been made, from time to time, to use the heat contained in slags, which at present is wasted. The late Sir Lowthian Bell evaporated brine for the manufacture of salt by means of this heat, but it was not a commercial success. Some four years ago Messrs. Bell Brothers again began experiments with a view to using the steam produced from slag in a low-pressure turbine. The slag used was that produced in the manufacture of ordinary Cleveland iron having an average analysis of:—

	Per cent.
Silica	28.30
Alumina	24.78
Ferrous oxide	0.30
Lime	32.39
Sulphide of lime	3.67
Magnesia	8.94
Manganous oxide	0.36
Alkalies	1.26
	100.00

The apparatus for producing the steam consists of a wrought iron circular vessel *B*, Fig. 1. Near one edge of the top plate of the granulator *B* is the hole through which the slag is poured; on the underside of this top plate and round the hole a circular ring 4 inches deep is fixed, which dips into the water to a depth of 3 inches, thus forming a hydraulic seal, and preventing the steam from escaping; inside the granulator are four vanes fixed on a vertical shaft, *D*, which cause the water to rotate. The slag comes from the furnace along the trough or channel *A*. When the slag drops into the water it granulates, and its velocity causes it to sink a certain depth. It floats for a time, but the rotation of the water causes it to come to the surface inside the vessel, otherwise it would block up the slag entrance; the granulated slag is then lifted by the elevator *E* into a second seal *F*, and there becomes waterlogged, sinks through the seal and is taken by a second elevator and dropped into cars. The feed water is introduced along with the slag at *C*; the surplus water which drains from the truck is also pumped back to *C* by a small pump fixed to the side of the apparatus. The steam generated comes off at *G*; at first it was intended to use this steam direct in an exhaust steam turbine. After numerous experiments on blades of different metal, it was found that duraluminum was affected very slightly, and a 50-kilowatt turbine with blades of this material was experimented with.

The steam produced from ordinary gray Cleveland slag contains about 0.5 per cent by volume of incondensable gases, the average analysis of which is:—

	Per cent.
Hydrogen sulphide	29
Hydrogen	55
Nitrogen	16

To deal with these gases a very big air pump would be required, so it was essential to absorb them between the condenser and the air pump. This was done by washing first with milk of lime to absorb the sulphuretted hydrogen, and then passing the remainder through a tube containing calcined Cleveland ironstone heated to a temperature of about 750 degrees Cent., and recondensing the water produced. The nitrogen was dealt with by the air pump. Under these conditions the plant ran for two months; at the end of that time the turbine was opened out, and the openings were found to be partly blocked up with fine sulphur, which had caused some wear of the blades. The sulphur, which it was impossible to eliminate by filtering the steam, was produced by the reaction:

$$2H_2S + SO_2 = 2H_2O + 3S,$$

this reaction being the probable cause of the entire absence of sulphur dioxide in the steam. The direct method was then abandoned, and a water heater and heat exchanger were introduced between the turbine and the primary generator. The water heater consists of an outer casing and tube plates with tubes 1¼ inches diameter fixed therein, placed vertically, the total heating surface being 156 square feet.

The one shown in the illustration

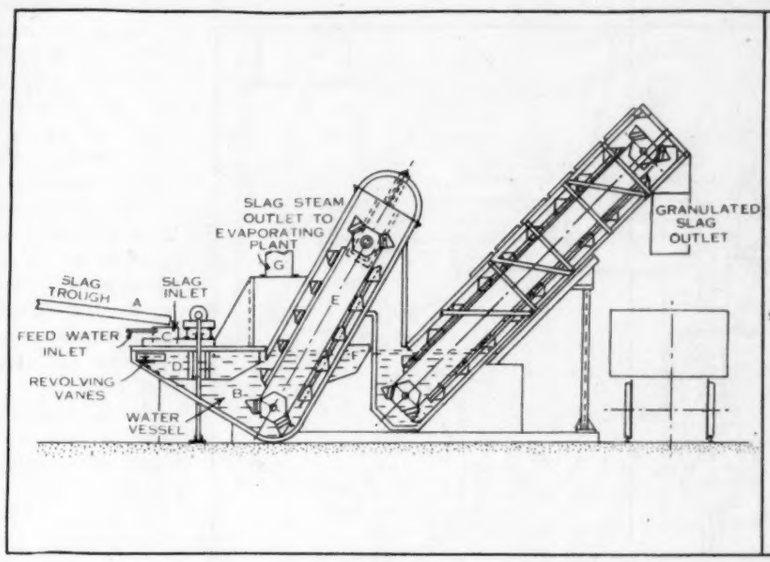


FIG. 1--SECTION THROUGH SLAG STEAM GENERATOR

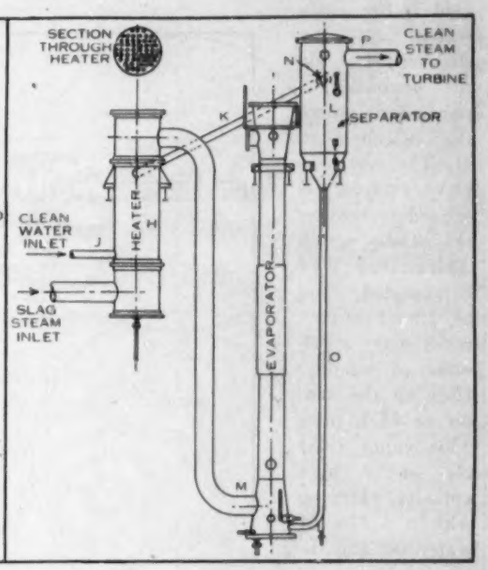


FIG. 2—SIDE VIEW OF EVAPORATING PLANT

A paper contributed to the Iron and Steel Institute of Great Britain.

is an improvement, but the one above described was used in order to see what action, if any, there was on the tubes. They were examined every week, but did not show any undue corrosion; there was, however, a deposit of fine sulphur on the shell and tubes.

The calandria, a Kestner single-effect climbing film evaporator, consists of two parts, the calandria proper and the separator. The former is composed of a shell or casing containing the evaporating tubes, which are about 23 feet long and 1 7/16 inch in diameter, and are fixed in upper and lower tube plates. The water is fed into the lower end of the heater *H* at *J* Fig. 2, and then passes from the upper end by the pipe *K* into the separator *L*. The dirty steam from the generator *B* passes inside the tubes of the heater, the clean water being on the outside, and the uncondensed remainder enters the calandria at *M*. The water in the tubes is caused to boil by the steam with which they are surrounded, and as ebullition takes place a column of vapor rises up the center of each tube. This vapor travels at a high velocity, carrying with it a film of water on the inner surface of the tubes. The water does not "climb" by capillary attraction nor by the liquid, the steam forming alternate links in the same way as in a Pohle air-lift. The operation is performed in a simple manner; the water begins to boil in the tubes and is gradually drawn up in a complete film by the vapor itself. As a result of this action a certain amount of water is carried up into the separator *L*, which acts as a steam drier; this water and the feed water from the heater, which enter at *N*, flow down the pipe *O*, entering the calandria at the bottom. The clean steam is delivered by the pipe *P* to the turbine, which is connected with the condenser in the usual manner. The sulphur deposited in the tubes of the heater is brushed out, and that in the calandria is removed by occasionally filling the dirty steam space with a dilute solution of caustic soda and heating with steam. There seems to be very little corrosion of the tubes of the heater or calandria; and after four years of intermittent working the primary generator does not show any signs of undue corrosion, the shafts of the elevator having a very thin, black skin on the surface only.

Efficiency of the System

The heating surface of the calandria is 548 square feet. A vacuum of about 9 inches of mercury is maintained in the separator, so that the water boils at 90 to 91 degrees Cent. With steam from the slag at 100 degrees Cent. and keeping a temperature in the calandria of 91 degrees, the mean of 22 experiments gave 173 gallons of water evaporated per hour, and the average steam per hour condensed in the calandria and heater was 190.2 gallons. The feed water entered the heater at an average temperature of 24.6 degrees Cent., and entered the calandria at an average temperature of 89 degrees, that is, 91 pounds of clean water was evaporated for every 100 pounds of steam from the slag. With the steam from the slag at 100 degrees and the temperature of 90.50 degrees, the mean of 27 experiments gave 177.2 gallons of water evaporated per hour, and the total steam condensed in the calandria and the heater was 198.3 gallons per hour. The average temperature of the feed water was 26 degrees Cent., and of the water entering the calandria 89 degrees Cent., or 89.4 pounds of water were evaporated for 100 pounds of dirty steam.

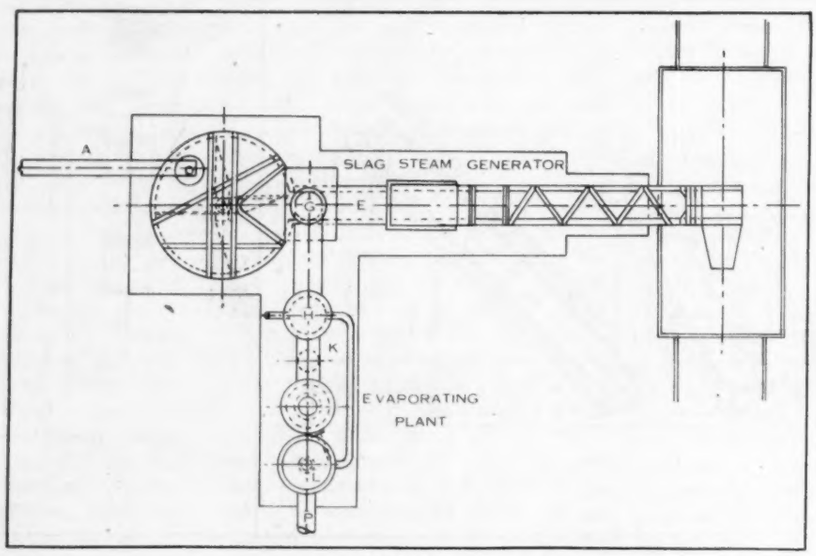


FIG. 3—PLAN OF EVAPORATING PLANT

As the condensation of dirty steam takes place, the percentage of incondensable gases naturally increases. When the percentage gets above 7.5, the calandria begins to lose its efficiency, and it is advisable not to allow that percentage to be exceeded. In order to control it a small outlet pipe is arranged on the top of the calandria, where the incondensable gases are drawn off together with a small proportion of steam; with 0.5 per cent of gas in the dirty steam there will be a loss of 6.6 per cent of steam.

Experiments were also made to determine the amount of available steam from the slag by condensing and measuring it. The mean of seven experiments gave 1,017 pounds per ton of slag, and deducting 6.6 per cent for escape with the incondensable gases there are left 950 pounds and 90 per cent of this gives 855 pounds of clean steam available for the turbine. Since modern exhaust steam turbines with a full load and a vacuum of 28½ inches can be guaranteed under the above conditions to use not more than about 27 pounds per horsepower, this gives 31.6 horsepower per hour per ton of slag per hour.

It is impossible to give the cost of running such a plant, because the practice at different works varies considerably. Apart from handling the slag, the cost of running the electric installation is the same as an ordinary exhaust steam turbine plant of a similar size, and the attendant can regulate the water in the calandria; there is, however, about 2 per cent more power required for the greater amount of condensing water per horsepower where the slag is already being granulated, there is the extra upkeep of the second elevator. One man per furnace should be able to attend to the primary generator and running in the slag, the remainder being all mechanical.

Ball bearings need oil, although some enthusiasts try to say that they will run without it. In a properly designed ball bearing the oil does not act as a lubricant but serves to keep the balls and races from rusting.

How Grinding Wheels Operate

A Graphical Analysis Showing the Cutting Action of the Wheel and the Effect of Changes in Diameter of Wheel or Work

BY GEORGE I ALDEN

LONG experience in the use of grinding wheels has developed and established facts regarding the action of such wheels when used on modern grinding machines. These facts, however, have been stated only as empirical rules. Such rules are easily forgotten or confused by operators because they are not related in any obvious way to any known principles by which results may be predicted. For example, what is the effect upon a wheel of increasing the speed of work, or of increasing the diameter of the work, or of diminishing the diameter of the wheel? The following analysis of the action of the grinding wheel when operating upon cylindrical or plane surface work, reveals a principle which leads at once to the answers to questions like the above. In all cases the term "speed," whether referring to work or to wheel, means peripheral speed.

In Fig. 1, let

C = the center of the wheel and

c = the center of the work

The arrows indicate the direction of motion of wheel and work respectively.

OP = the radial depth of cut, and

OQ = the arc of contact of wheel and work

Each of these dimensions is much exaggerated in the figure, the real dimensions in actual work being exceedingly small. Assume for a moment that there is but one abrasive grain or cutting point in the surface of the wheel, and that this one grain is at O. On account of the revolution of the wheel, the point O will move to Q in a certain time, but on account of the revolution of the work, the point Q on the work will move toward P to the point W. As the speed of the work is usually very much less than the speed of the wheel, this distance QW will be much less than OQ. The cutting point will remove from the work a chip represented by OQW. From the outline or shape of the chip it appears at once that when the cutting point begins to act at O, its depth of cut is nothing, but that the depth of cut of the grain increases gradually to its maximum WS. As the abrasive grain in a grinding wheel is set or fixed in the bond of the wheel, it is clear that the deeper the grain cuts into the work, the more the bond will be disturbed, or worn away. I have called the distance WS the maximum grain depth of cut, or, for brevity, the grain depth of cut. Of course, there are actually a number of cutting particles between O and Q, but each acts in the same manner as the single grain we have considered. The grain depth of cut of each particle, however, will be the distance WS divided by the number of cutting grains or particles in action at once, or the number between O and Q.

When a grinding wheel is working properly, we may consider the abrasive grain in the wheel as cutting small chips from the work, and the surface of the work as cutting or wearing away the bond of the wheel. Now, it is quite evident that the greater the grain depth of cut, the more effective will be the action of the work upon the bond of the wheel. So long as the bond is being worn away just as fast as the abrasive grains of the

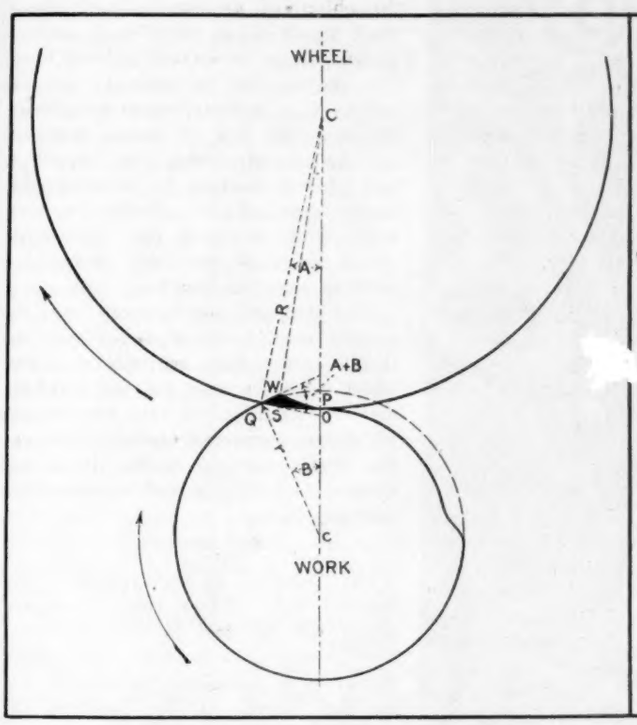


FIG. 1—ACTION OF GRINDING WHEEL WHEN OPERATING ON CYLINDRICAL WORK

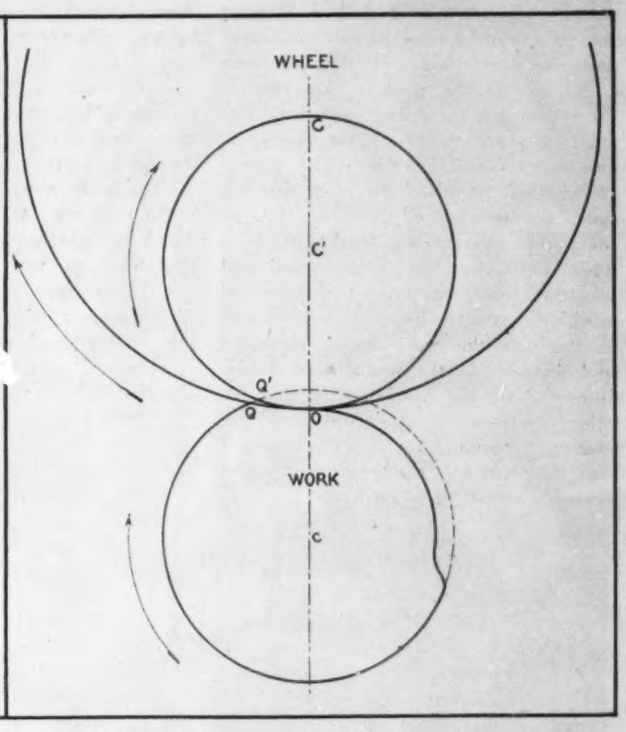


FIG. 2—EFFECT OF CHANGES IN DIAMETER OF WHEEL OR WORK

Presented at the annual meeting, December 1914, of the American Society of Mechanical Engineers.

wheel are being worn down, the wheel will continue to work well. If the bond is cut away too rapidly, the wheel will appear too soft, and will wear away too rapidly. If the cutting grains wear down faster than the bond is cut or worn away, the face of the wheel will become glossy, and the wheel will not cut freely. These considerations lead directly to the conclusion that the action of a given wheel on a given kind of work is almost entirely dependent upon the grain depth of cut. If the grain depth is too great, the wheel wears away too rapidly. If the grain depth is too small, the wheel may glaze. It is therefore important to know how the grain depth of cut may be reguated.

Referring again to Fig. 1, it appears that *WS* will increase if *QW* increases and vice versa; but *QW* depends upon the speed of the work. Therefore if the speed of the wheel remains constant, and the speed of the work increases, *WS* will increase. The correct working of the wheel therefore depends upon the relation of *QW* to *OQ*, or upon the relation of work speed to wheel speed. If the wheel speed and all other conditions except work speed remain constant, the grain depth will increase as the work speed increases, and diminish as the work speed diminishes. Also the work speed and all other conditions except wheel speed remaining constant, the grain depth of cut will increase as the wheel speed diminishes and vice versa.

Effect of Changes in Diameter of Wheel or Work

In Fig. 2, let

C = the center of a grinding wheel

C' = center of a smaller grinding wheel

c = the center of the work

Suppose the wheel whose center is at C to have worn down until its center is at C', the work diameter remaining the same. Let the radial depth and work speed also remain constant. This insures the same rate of production in each case. Let the wheel speed also be the same in each case. It will be seen from Fig. 2 that the smaller wheel will have a shorter arc of contact with the work than has the larger wheel, or that OQ' is less than OQ. Since the wheel speed in both cases is assumed to be the same, the number of chips cut from the work each minute will be the same; but as the chips cut by the smaller wheel are shorter, and as the volume of all the chips cut each minute is the same, it follows that the thickness of the chips cut by the smaller wheel is greater than the thickness of the chips cut by the larger wheel. In other words, the grain depth of cut increases as the wheel diameter diminishes. Therefore the bond should wear away faster as the wheel gets smaller, and the smaller wheel should appear softer.

In many cases as the wheel wears down, the speed of the wheel is allowed to diminish, and when this is the case the grain depth of cut will be increased on account of the diminished wheel speed, as well as because of the smaller wheel. Following the same line of reasoning as above it is easily shown that if the work diameter is increased (all other factors remaining the same) a longer chip will be cut from the work, and as the number and volume of chips remain constant for each unit of time, the thickness of the chips must diminish, or the grain depth must be less. Therefore a wheel, other conditions being the same, should appear harder as the diameter of the work increases. A proper increase of work speed on the larger work will bring up the grain depth of cut to what it was on the smaller work.

Summarizing these conclusions, to which we are led by purely theoretical considerations, we can say:

a Other factors remaining constant, increase of work speed increases grain depth of cut, and makes a wheel appear softer.

b Similarly, a decrease of wheel speed increases grain depth of cut

c Similarly, diminishing the diameter of the grinding wheel increases grain depth of cut, and increasing the diameter of the wheel decreases grain depth of cut

d Similarly, making the diameter of work smaller increases grain depth of cut. Conversely, making the diameter of work larger makes grain depth of cut smaller

In the above analysis no account has been taken of certain factors that no doubt modify to a degree the results arrived at. For example, chips cut from the work by the abrasive particles of the grinding wheel are not entirely free to escape. Referring to Fig. 1, the arc *OQ* will, in practice, contain several cutting points, so that several chips are in the process of being cut off at once. Before these chips all escape, some of them may be forced into spaces between the cutting particles in the face of the wheel, causing the wheel to "load." This loading may at times be such as greatly to reduce or even practically to destroy the cutting quality of the wheel. Even though the wheel does not "load," the presence of loose chips of metal between the wheel and the work may impair the cutting action of the wheel or the quality of the ground surface produced; but the statements *a*—*d* inclusive are recommended as giving correct relative results.

In applying the principle that grain depth of cut is the main factor in all the phenomena of a good grinding wheel, it must be remembered that the correct relative speeds of work and of wheel must be found by trial for each wheel and each kind of work. When this has been done, the principle of grain depth of cut will enable one to know the direction in which to make the changes of work speed or wheel speed, to adapt the wheel to changes in its own diameter, or to other sizes of the same kind of work.

Finishing

Thus far it has been assumed that the object of grinding is to remove stock rapidly or, in other words, to get a high rate of production. Often, however, the character or finish of a ground surface is of primary importance. From the point of view of grain depth of cut, we should reason that to get a very smooth surface by grinding, the grain depth of cut should be very small, and therefore that the work speed should be relatively slower for finishing than for roughing.

That the bond may be worn away by a very small grain depth of cut, we should expect that generally a softer wheel would be used for fine finishing than for roughing. A very hard glazed wheel may sometimes produce a mirror-like surface on the work; the action in this case being a sort of burnishing process.

The committee on management of the International Engineering Congress which will be held in San Francisco next summer, announces that some changes will necessarily be made in the program owing to the hostilities in Europe. The total number of papers was 290 including contributions from France, Germany, Australia, England and other countries now at war. It is believed, however, that a considerable portion of these papers will be obtained regardless of the present situation and that therefore the general plans for the Congress may be carried out with a minimum of change.

A reasonable slackness for engine bearings from 6 to 12 inches in diameter, is about 0.005 inch; for crankpin and crosshead pin bearings up to 4 inches in diameter about 0.004 inch. These dimensions can easily be approximated by setting the bearing up tight, then slacking back a certain number of faces on the wedge-bolt head, depending upon a number of threads and the taper of the wedges.

Death of Chas. A. Moore

Charles A. Moore, president of Manning, Maxwell & Moore, Inc., New York, with branches in all the principal cities of the country, died of heart disease on the steamship Rotterdam, which left New York on Dec. 1. The news of his death was conveyed to New York by a wireless message which was filed on the ship on Dec. 8. Mr. Moore, accompanied by Mrs. Moore, was bound for Naples, where he had planned to spend the winter.

Mr. Moore was born on a farm in West Sparta, N. Y., 69 years ago. He served in the navy during the civil war, after which he became a machinery salesman in New England. Following 15 years of this work, he went to Brooklyn, N. Y., and formed a partnership with Henry S. Manning and Eugene Lascelles Maxwell. This organization ever since has had a phenomenal career in the machine tool and railway supply business, and its name for many years has been one of the best-known corporate titles in existence. Mr. Moore had large interests in the Consolidated Safety Valve Co., the Hayden & Derby Mfg. Co., the Hancock Inspirator Co., the Shaw Electric Crane Co., the United Injector Co., the Ashcroft Mfg. Co., the Windsor Machine Co., and other concerns.

Always actively interested in politics, Mr. Moore was a close personal friend of President McKinley and frequently accompanied him on trips around the country. For some years, he was president of the American Protective Tariff League, and he was prominent for his participation in movements for civic betterment. Mr. Moore was a member of a great number of organizations of all kinds, including clubs, technical societies, business organizations, etc. He had a fine country place at Greenwich, Conn., where he moved in 1903 from Brooklyn.

Compact, Standard First Aid Jar

(*Continued from page* 1136)

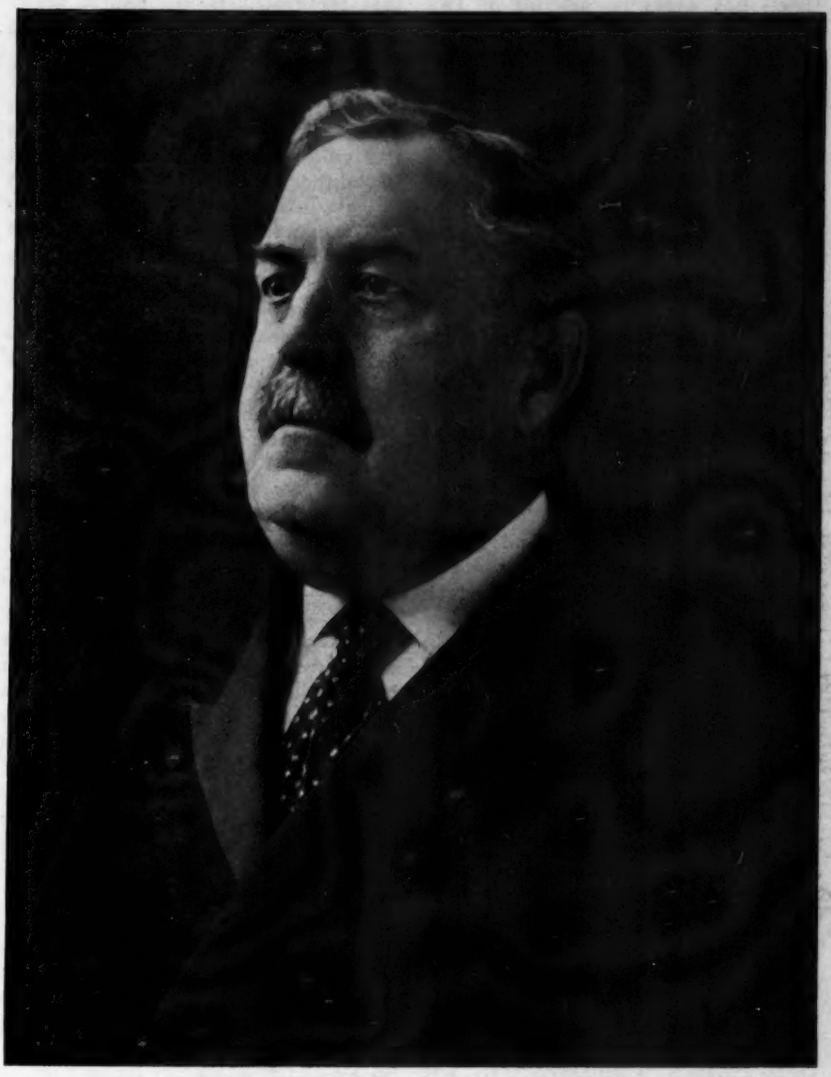
in place by bandages this splint affords ample protection to the broken limb until a physician can set the fracture.

Although it is not contemplated to use water in first aid work, yet when necessary, both the jar and the metal dish may be utilized as water vessels.

To furnish proper material for first aid treatment of injured and sick persons and not, at the same time, state how these materials should be used, would also be doing half a job only. It is necessary therefore to include in the first aid outfit suitable first aid instructions. If these were provided in the form of a book or leaflet, they might be misplaced or lost. In order that they may always be at hand in the most convenient form, they are printed on the inside of the cover of the jar, while on the outside appears the standard list of first aid materials which should always be kept in the jar, also brief directions for the use and care of the outfit.

Some employers will desire to place a jar on each truck or wagon used in connection with outside construction work. In this event, the jar should be kept in the padded shipping box, which is provided with an opening in the lid so that the whole outfit can be carried by the handle of the jar. When desired a lock may be attached to the box.

The whole arrangement of the jar warrants the claim that it is a compact, convenient, sanitary first aid outfit. It is called the National Affiliated Safety Organizations' jar because it has been standardized by the conference board on safety and sanitation and accordingly stamped with the National Affiliated Safety Organizations' mark.



CHAS. H. MOORE,
Late President, Manning, Maxwell & Moore, Inc.

Foreign Inquiries

An inquiry for 8,000 tons of steel bars has been received by the Pittsburgh Foreign Trades Commission, Farmers' Bank building, Pittsburgh, from J. Rogers Flannery, head of the Flannery Bolt Co., that city, who is representing the commission in England. Makers of aluminum ware in the Pittsburgh district have been asked to quote on an order involving about $300,000 worth of canteens, for shipment to one of the belligerent nations.

The Fond du Lac Implement Co., Fond du Lac, Wis., manufacturer of machine, wagon and sleigh castings, has discontinued its foundry business.

Problems of Capital and Labor

Colorado Coal Operators Have More Miners Than They Need—How the Low Commission is Considered—Trouble in the Union

Denver, Dec. 14.—The action of the United Mine Workers in declaring off the strike of the Colorado coal miners is not regarded as materially affecting the present situation in the state. For weeks, as asserted in THE IRON TRADE REVIEW, the operators have considered the strike as ended. Their principal trouble now is to sell enough coal to keep employed the men who are now at work. Prices are very low and many of the mines are storing the greater part of their production of slack, pea and nut coal. The weather has been very mild and unless cold weather comes soon, many of the companies will find it difficult to finance their operations.

Operators are not saying much for publication in regard to President Wilson's mediation commission, of which Seth Low is the chairman. Secretary Wilson, who is avowedly a partisan of labor unions, has succeeded in thoroughly discrediting himself with the Colorado operators. They suspect that he has had a hand in the formation of the mediation commission and they are not likely to look upon the commission with favor unless they are satisfied beyond all doubt that the operators will be given a square deal.

One of the reasons for declaring off the strike was that strikers in Ohio and other states are complaining because they have had few strike benefits, while money has been poured out freely to conduct the Colorado strike. There is also much dissatisfaction among the union members on account of the way in which the strike funds have been handled in Colorado. Charges have been filed against one union man who has been prominent in the strike. It is alleged that some miners have received greater strike benefits than others. Union leaders have been recruiting new men in Pueblo to move into the tent colonies this winter. These recruits never worked in any Colorado coal mine.

The rumor is that the President gave a chilly reception to the committee of the mining department of the American Federation of Labor which waited on him about three weeks ago and that the scheme of calling off the strike has been cooked up in order to enable the President to get the federal troops out of Colorado. It is believed the union program will be to lie quiet until about Jan. 25, when some pretext will be found for ordering a second strike in Colorado, hoping that in the meantime the operators will have put a lot of the former strikers to work and that these strikers can lead a stampede out of the operators camps. Then the Low commission will be ready to serve as a mediation body for the second strike. Plausibility is given to this theory by interviews printed from Washington, stating that while the Low commission may not be able to do anything with the present controversy, it is created to meet future controversies as well as the existing one.

Ex-Senator Patterson, in his testimony before the United States Commission on Industrial Relations a few days ago, said that there was no hope whatever of getting the Colorado operators to recognize the union and he characterized them as impervious to any such suggestion. Operators state that this is correct.

Drew's Pointed Comments

Walter Drew, counsel for the joint committee, composed of a number of large national open-shop organizations of employers, which has been assisting the United States Commission on Industrial Relations during the past seven or eight months in its work of investigation, was asked his opinion in regard to the preliminary report of the commission, submitted to Congress on Dec. 7. He said:

"The abstract of the preliminary report of the commission covers in briefest possible form the substance of the report. It is not possible to criticize the report itself properly with only this abstract before us, the brevity of which makes it difficult, if not impossible, to portray the spirit of the report or the relative values and proportions of the different questions and subjects touched upon. There is nothing in the abstract to distinguish the statements and claims of the single witness, perhaps of manifest bias and prejudice, from other statements and claims which have the endorsement of many witnesses and which, therefore, could be called more truly representative.

"The public knows that the American Federation of Labor and its allied unions insist upon the closed shop as a fundamental principle, and that wherever possible the question of a closed shop will not be considered open to discussion or arbitration, and union men, in pursuance of this principle, will not be permitted to take employment in any shop or business where non-union men are employed. A very large percentage of the strikes of recent years have had for their purpose not increase of wages or decrease of hours, but the establishment of the closed shop, and this is true of the Colorado strike, which has reached the proportions of civil war and which the commission is at the present time investigating.

Closed Shop Agreements

"The objection most frequently and strongly stated by the open-shop employer, not to trade agreements, but to closed-shop trade agreements, is that the union itself is legally irresponsible. If it invades the rights of others unlawfully, it cannot be sued and damages recovered from the funds in its treasury. Of course, its individual members are liable, if their participation or acquiescence in the unlawful act can be shown, but damage suits against a large number of individual workers are obviously impracticable. There is abundant evidence that the executive board and duly elected officers of the Iron Workers' Union used the union's funds for years to cause explosions upon open-shop work, resulting in hundreds of thousands of dollars damage, and yet there is no legal remedy by which the employers who were damaged can sue the Iron Workers' Union and levy upon its funds, although at the present time it has upwards of $100,000 in its treasury.

"The workman in the closed shop holds his job by the power of his union, and not by his own merit. He has no incentive to increase his output or skill. He has no spirit of cooperation with the employer. Labor-saving machinery and methods are instinctively opposed as depriving men of work. Working below normal effort is often justified, because it makes work last longer or makes work for more men. Petty, arbitrary rules and methods of work are laid down by the union, and often the amount of work permitted to be done is specified. Much testimony and many figures were submitted, showing the

Problems of Capital and Labor

Walter Drew Makes Interesting Comments on Recent Report of Industrial Relations Commission—Colorado Strike Commission Organized

greatly decreased cost of operation in the open shop as compared with the same shop when closed, even with increased wages being paid in the open shop. It is evident that a closed shop business, or city, or nation, is at a disadvantage in competition. San Francisco, where the closed shop has long been dominant, has, by the evidence of her own closed-shop employers, lost a large part of her manufacturing industries, and large works and plants are now used only for repair work because of the inability to compete with the manufacturers of other cities.

"Power and irresponsibility also lead to arbitrary and unfair domination and practices. In San Francisco, for instance, on all contracts for brick work the contractor must pay to the bricklayers' union one-half of 1 per cent of the contract price. The following receipt, placed in evidence, shows this almost unbelievable practice, enforced in this instance by strike:

Bricklayers' Union No. 7 (B. M. and P. I. U., Local No. 7), hereby acknowledge receipt of forty dollars ($40.00) from Brandt & Stevens, being one-half of one per cent (½ of 1 per cent) of the sum of $8,000.00, approximate cost of brick work on the Stewart job at the northeast corner of Ellis & Mason streets, San Francisco, paid in accordance with Rule 5 of said union, requiring general contractors to pay said percentage to the treasury of the union on every job of brick work.

It is understood that the exact cost of said work and of the one-half of 1 per cent to be paid on it is to be determined hereafter.

It is understood that the strike called by the union on said job on account of said money required by said rule not having been paid, is to be called off, and that Brandt & Stevens are paying said sum under protest to bring about the termination of the strike, and without acknowledging the right of the union to enforce said rule.

Dated, San Francisco, July 16, 1914.
BRICKLAYERS' UNION NO. 7.
By (Signed) C. Noonan,
Business Agent.

"Practically all of the bitter boycotts and devastating sympathetic strikes have for their final purpose the establishment of the closed shop. Both these methods ruthlessly invade the rights of innocent third parties who have no voice or control in the original controversy. A union, which would not break its own agreement if a question of wages or hours of its own members were involved, will, without compunction, disregard this agreement and go on sympathetic strike to help another union establish a closed shop.

"The jurisdictional dispute, which, interpreted, means the quarrel of two closed-shop unions as to which shall perform a certain class of work, belongs also in this category. In 1911 for many months a great portion of the building operations of the city of Chicago were tied up while rival unions disputed and fought over questions of jurisdiction and even inaugurated civil war against each other, their rival gunmen reducing the city of Chicago to a state of anarchy during its continuance.

Collective Bargaining

"So far as collective bargaining is concerned, there is no objection to it in principle, nor as a general rule is any such objection made. In a closed shop, however, there can be no real bargaining, collective or otherwise, for a bargain presumes two voluntary contracting parties each having a certain choice or freedom in the making of the contract. The employer in the closed shop has no such freedom, nor does he contract voluntarily. The dictation of terms by victor to vanquished more nearly defines the relationship. The open-shop employer sees no inconsistency or impractical feature to the making of trade agreements in an open shop except the fixed closed-shop policy of the union itself and its refusal to make agreements on any other than a closed shop basis. He cannot understand why it is necessary to give a union a monopoly in order to do business with it. If a union cultivated the ideals of efficiency and co-operation and limited its membership to meet high standards, and did not insist on a monopoly, it would find employers ready and willing to do business with it.

"The closed shop and the evils which seem to be inevitably connected with it in operation are responsible for whatever prejudice there exists today on the part of the open-shop employer and of the public against unionism.

"We are looking now to our great manufacturing interests to extend our trade to the world's markets. The closed shop and all that goes with it would, if fastened upon our industries, constitute a most serious handicap in the effort towards national expansion. In the great open shops of the country, as shown by the evidence before the commission, are to be found today the most progressive and efficient methods of operation and management and also the most thorough care and treatment of the employe in matters of safety, sanitation and welfare. It is largely to these open-shop employers that the country today is looking to take up and carry the responsibilities and burdens of the present critical situation. In turn, they ask of the country a fair consideration and understanding of their position. They ask the public also to remember that it is the consumer who pays the final price brought about by conditions in industry and that the employer who sets his face against inefficiency, uneconomic practices and the final conspiracy of combined employers and closed-shop union against the public, not only represents true American ideals in industry, but also stands for the common good."

Colorado Commission Organized

Washington, Dec. 15.—The Colorado strike commission was formally organized last Saturday at the Department of Labor in the presence of Secretary William B. Wilson. The commission was recently selected by President Wilson, Seth Low was made chairman of the commission, the other members being C. W. Mills and Patrick Gilday.

The President appointed the commission before settlement of the Colorado strike that it might be ready to act in the event there is any future dispute. The commission members said, after the organization had been effected, that there seems no reason for the present why they should go to Colorado.

The first meeting of the commission was held last Friday with President Wilson who outlined efforts he had made to restore industrial peace in the strike districts. Gov. Ammons of Colorado having refused to accept responsibility by requesting that all the federal troops in the strike districts be withdrawn, President Wilson has concluded to await further developments before ordering the troops away. It was upon the request of Gov. Ammons that the federal troops were sent to Colorado.

Business News from the Capital

Bill to Supervise Railroad Securities Not Dead But Only Sleeping—Number of Members of Interstate Commerce Commission May Be Increased

Washington, Dec. 15.—Senator Newlands, chairman of the interstate commerce committee of the senate, after a visit at the White House last Thursday, said the Rayburn bill, in his opinion, is far from being dead. The bill, providing for supervision by the Interstate Commerce Commission, of the issue of railroad stock and bonds, was the third and final one in the administration's original anti-trust program. But it had been the general belief that the measure had been entirely abandoned, and there was much evidence to support that position. The statement of Senator Newlands, therefore, was a distinct surprise. Its being made by him immediately after a conference with the President emphasized the matter. The senator said the President had not abandoned the bill, but wants it to go over till the next session and provision made for increasing the membership of the commission. The senator discussed with the President a plan for increasing the membership of the Interstate Commerce Commission from seven to nine members. It is his idea to make this increase in membership and to divide the commission into sections to look after the various kinds of work assigned to it. These provisions, he pointed out, will very likely be made in an amendment which he said would be offered to the Rayburn bill.

The statement of the President in his address to congress last week, to the effect that legislation affecting business was virtually complete, seemed to make certain that the Rayburn bill had been abandoned. The Interstate Commerce Commission, in its annual report, just issued, repeated its recommendation for legislation providing control over railroad capitalization.

"The Interstate Commerce Commission is overburdened with work at present," said Senator Newlands, "and it is perhaps not an opportune time to enact into law a bill which will place more work upon the shoulders of the commission. But that does not mean that the stock and bond issue bill will not be taken up in the future."

He said it was not probable that it would be taken up at the present session, but indicated it would be at the next one.

"One section of the commission," said Senator Newlands, "could devote its time to railroad rates, another to the physical valuation of railroads, and a third to supervising the issues of securities by railroads, as provided under the Rayburn bill. Of course, the commission could at times sit as a whole—very properly should; and also it would be advantageous to change the kind of work of the various sections from time to time."

It was pointed out that it was highly probable these suggestions would be included in an amendment to the bill. The senator will call a meeting of the committee to consider the matter and also what disposition shall be made of the Rayburn bill at this session.

Submarines of the Future

Washington, Dec. 15.—Naval officers generally are looking forward with great expectations to the construction of the submarines for which bids were opened today at the navy department. These officers discuss the subject in discreet terms, but it is plain they believe that in the United States, where the submarine was invented, it is to be developed to a degree of efficiency that is to become a wonderful instrument of war. Naval experts, however, have observed nothing transpiring during the European war which has shaken their faith in the efficacy of the dreadnaught.

A submarine with a speed of 30 knots or more above water may, as it is developed, take the place of the present torpedo boats or become a torpedo boat destroyer. It will be able to fight effectively both above and below the water. Naval officers said that the construction of submarines was one branch of the service in which it could not be said this government was behindhand.

Secretary Daniels said that he believed the submarines will be the largest and most powerful ever constructed by any government.

"Of course," continued the secretary, "we do not know just now what the European nations are doing in the matter of the increase of their navies, but it is my judgment that these proposed submarines will be more efficient and a more thorough branch of the naval service than anything thus far developed by others. Something of their character may be known when I tell you that they will be intended to accompany a fleet wherever it may go. That means they will be able to cross the ocean under their own power, and, if they are to be a portion of a defensive or offensive fleet must be capable of making the same speed as the swiftest of the vessels that comprise the fleet."

Permits Increase

Washington, Dec. 15.—Permission has been granted by the Interstate Commerce Commission for carriers to establish joint through rates between points in Central Freight Association territory and points in western, southwestern and southeastern territories which may be in excess of the existing joint through rates sufficiently to allow Central Freight Association territory lines an increase of 5 per cent above their customary divisions. The authorization was given in an order supplemental to the commission decision of last July in the 5 per cent advance rate case, and modifies that part of the decision which said these rates which now may become effective upon five days' notice, should be canceled. These joint through rates shall not apply to commodities on which the commission denied advanced rates in its July decision. In this list are coal, coke and ore.

Another Coming

Washington, Dec. 15.—Attorney Frank Lyon, representing Virginia blast furnace interests, is preparing a supplemental petition with a view to straightening out the confused pig iron rate situation consequent upon the decision of the Interstate Commerce Commission in the case of the Low Moor Iron Co., and other makers of Virginia. The rates to New England and middle west states were ordered lowered, but, as in the Sloss-Sheffield pig iron decision, only those lines made defendants reduced rates at first and some of them are declared to have reduced to all points affected by the decision.

The Bowers Torpedo Co., Oil City, Pa., manufacturer of an explosive for shooting oil wells, has received specifications for 200 torpedoes for shipment to England. The company will confer with government officials before accepting the order.

New Bookings

Of Steel Corporation Light as Shown by Unfilled Tonnage

For the third consecutive month, the unfilled tonnage of the United States Steel Corporation showed a falling off when announced for November at New York, Dec. 10, making the total loss in the three months 888,739 tons. The reduction in November was 136,505 tons, as compared with 326,570 tons in October and 425,664 tons in September. The order book on hand Nov. 21 represented 3,324,592 tons, compared with 3,461,097 tons on Oct. 30. The November decline in tonnage is at the rate of about 6,200 tons daily for each work day, which, on the basis of recent operations, indicates that new bookings averaged not more than 12,000 to 15,000 tons daily during the month of November.

A statement of the unfilled tonnage of the Steel Corporation, showing the changes in tonnage and percentage by months, since the plan of announcing monthly the business on hand was adopted, follows:

Date.	Total.	Change, tonnage.	Change, per cent.
Nov. 30, 1914....	3,324,592	136,505—	3.94—
Oct. 31, 1914....	3,461,097	326,570—	8.62—
Sep. 30, 1914....	3,787,667	425,664—	10.01—
Aug. 31, 1914....	4,213,331	54,742+	1.32+
July 31, 1914....	4,158,589	125,732	3.12+
June 30, 1914....	4,032,857	34,697+	0.86+
May 31, 1914....	3,998,160	278,908—	6.98—
Apr. 30, 1914....	4,277,068	376,757—	8.09—
Mar. 31, 1914....	4,653,825	372,615—	7.42—
Feb. 28, 1914....	5,026,440	412,760+	8.95+
Jan. 31, 1914....	4,613,680	331,572+	7.74+
Dec. 31, 1913....	4,282,108	114,239—	2.59—
Nov. 30, 1913....	4,396,347	117,420—	2.60—
Oct. 31, 1913....	4,513,767	490,018—	9.79—
Sep. 30, 1913....	5,003,785	219,683—	4.24—
Aug. 31, 1913....	5,223,468	175,888—	3.03—
July 31, 1913....	5,399,356	407,965—	7.03—
June 30, 1913....	5,807,317	517,005—	8.18—
May 31, 1913....	6,324,322	654,440—	9.38—
Apr. 30, 1913....	6,978,762	490,194—	6.55—
Mar. 31, 1913....	7,468,956	187,758—	2.45—
Feb. 28, 1913....	7,656,714	170,654—	2.18—
Jan. 31, 1913....	7,827,368	104,796—	1.32—
Dec. 31, 1912....	7,932,164	79,281+	1.01+
Nov. 30, 1912....	7,852,883	258,502+	3.40+
Oct. 31, 1912....	7,594,381	1,042,874+	15.33+
Sep. 30, 1912....	6,551,507	388,132+	6.29+
Aug. 31, 1912....	6,163,375	206,296+	3.46+
July 31, 1912....	5,957,079	149,773+	2.58+
June 30, 1912....	5,807,346	56,363+	0.98+
May 31, 1912....	5,750,983	86,983+	1.52+
Apr. 30, 1912....	5,664,885	360,044+	6.97+
Mar. 31, 1912....	5,304,841	149,359—	2.79—
Feb. 29, 1912....	5,454,200	74,479+	1.38+
Jan. 31, 1912....	5,379,721	294,960+	5.71+
Dec. 31, 1911....	5,084,761	942,806+	23.24+
Nov. 30, 1911....	4,141,955	447,627+	12.06+
Oct. 31, 1911....	3,694,328	83,011+	2.25+
Sep. 30, 1911....	3,611,317	84,668—	2.34—
Aug. 31, 1911....	3,695,985	111,900+	3.33+
July 31, 1911....	3,584,085	223,027+	7.16+
June 30, 1911....	3,361,058	247,871+	7.96+
May 31, 1911....	3,113,187	105,617—	3.28—
Apr. 30, 1911....	3,218,704	228,597—	6.63—
Mar. 31, 1911....	3,447,301	46,758+	1.37+
Feb. 28, 1911....	3,400,543	289,624+	9.31+
Jan. 31, 1911....	3,110,919	436,163+	16.30+
Dec. 31, 1910....	2,674,757	85,656—	3.09—
Nov. 30, 1910....	2,760,413	111,536—	3.88—
Oct. 31, 1910....	2,871,949	286,157—	9.12—
Sep. 30, 1910....	3,159,106	379,088—	10.74—
Aug. 31, 1910....	3,537,128	433,803—	10.92—
July 31, 1910....	3,910,931	286,863—	6.72—

Is a Constructionist.—"While it is true that the engineer is the creator of the instruments of destruction, which make modern warfare a possibility, yet he is in no way responsible for the present war," Paul M. Lincoln, president of the American Institute of Electrical Engineers, said at the annual banquet of the Pittsburgh section of that organization, Dec. 12, at the Fort Pitt hotel, Pittsburgh. "The engineer is essentially a constructionist,—not a destructionist, and is not responsible for the manner in which emperors and kings choose to employ his achievements."

Detroit Plant

Accepts Offer of Water Board—Reply to Criticism

Detroit, Dec. 15.—The Detroit plant of The American Car & Foundry Co., tentatively awarded the contract for 25,000 tons of 42-inch and 48-inch pipe at a meeting of the Board of Water Commissioners last week, has accepted the board's suggestion of $21.45, which is $700 lower than the bid of the Warren Foundry & Pipe Co., of Phillipsburg, N. J., and which brings the bid to an approximate figure of $489,000. The Detroit concern's first bid was $500,000, in round figures, and was about $11,000 higher than the Warren company's bid; the change was made that a Detroit concern might be given the contract and employment furnished to Detroit laborers.

Some outside criticism was directed at the water commissioners for their action in notifying a Detroit concern of what its bid would have to be after announcing the amount of the outsider's proposal. The move, however, was defended in this manner by the secretary:

"There are thousands of men out of work in Detroit this winter; it is necessary that we take care of our idle men first; if there is enough work to go around, that means better times for Detroit and that is all we are striving for. The board, in awarding the contract to the American Car & Foundry Co., under condition that it bring its figure to a point $700 below the figure of the Warren company acted on the principle of home protection. The awarding of this contract means that hundreds of men now idle will be taken care of and when the work of laying the main begins we will take care of several hundreds more. There was nothing irregular in the proposition."

The American company accepted the suggestion after little parleying. Work will be started at once.

The Bucyrus Co., South Milwaukee, Wis., has been awarded the contract for furnishing a large clam shell dredging machine to the United States government for use in levee construction at New Orleans. The contract amounts to $44,000.

Ground Broken

For New Plant at Chattanooga Enameling & Stamping Co.

Ground was broken, Dec. 10, for the first building of the Chattanooga Enameling & Stamping Co.'s plant at Chattanooga. President P. J. Kruesi and Industrial Manager C. W. Howard, of the Chamber of Commerce, which was instrumental in locating the industry there, were in attendance. William Lipphardt, of Wheeling, W. Va., head of the new concern, is an experienced manufacturer of sheet iron and steel enameled products. After many years of successful business, he desired to make a change, and was in position to seek the best location regardless of artificial inducements such as are furnished by some localities to attract new industries.

Under the charter of the Chattanooga Enameling & Stamping Co., applied for in Tennessee, it will have a paid in capital stock of $200,000. It is expected that the first building (100 x 300 feet) at least will be finished by March 1 and that manufacturing will then begin with an initial force of about 250 men. The products include a wide variety of domestic articles, gas stoves, railroad semaphores, and enameled parts. The building for which ground was broken with ceremony is but the first of several. W. H. Sears, Chattanooga, is designing and supervising architect for the plant.

Among the favorable conditions which Chattanooga has for the new industry is a good local market for enameled parts, which the manufacturers are now getting from a distance. Mr. Lipphardt will have practical monopoly of a large southern market on account of the distance to other enameling plants north of the Ohio river. Chattanooga is admirably adapted to industries that can cater to the southeastern tier of states, because of its central location and transportation facilities.

Detroit Foundryman's Association

At a regular meeting of the Detroit Foundrymen's Association, which took place Dec. 10, C. G. Smith, president and general manager, Pittsburgh Emery Wheel Co., Pittsburgh, gave an address entitled "The Increased Efficiency and Economy Obtained by the Introduction of Safety Devices in Grinding Practice". Mr. Smith is a member of the safety board of the State of Pennsylvania, and brought out many interesting points during his discourse.

Scarcity of Labor in Great Britain

Employers Object to Workingmen Enlisting

Iron City, Birmingham, Made Darker—Expansion of Business Due Largely to Demands for War Materials—Pig Iron Shows Steady Improvement

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Nov. 30.

The arrival of winter conditions has added to the miseries of the war, and deepened the desire for peace. It is dreadful to think of the conditions on the battlefield. But there is an optimistic feeling that recent events have brought definitely nearer the much-desired termination; although doubtless the end is still a long way off.

It is more pleasant to refer to the thoughful gift of America to the children of the warriors. This has immensely strengthened the kindly feeling existing between Great Britain and America. When the Santa Claus ship Jason, from America, arrived at Plymouth, it received a very hearty reception. Everybody agrees that it is one of the prettiest incidents connected with the war. Plymouth was decorated in celebration of the arrival, the inhabitants responding with delight to the Mayor's appeal to show bunting.

Within the past few days drastic orders have been issued in Birmingham, further darkening the city. Every projecting light whether in the street, the public square, or in front of business premises, is either shaded or extinguished, and Birmingham now rivals London in the depth of its dismal darkness. Business continues to improve, and this, really, is the explanation of the slackening of enlistments about which some of the authorities are so much concerned. A large number of London employers have refused permission to members of their staffs to enlist, justifying their attitude by saying that it is as important to keep the wheels of British commerce moving smoothly as to supply recruits to the army and navy. The authorities are now appealing to employers to put their national obligations before the convenience of civil business.

British Shipping

Equally satisfactory is the position of British shipping as shown by a board of trade return just issued. After 16 weeks of war, while German shipping has been almost completely swept from the seas, 97 per cent of the British tonnage remains afloat. At the beginning of August, Great Britain's total was 10,123 vessels of over 100 tons gross register, representing an aggregate tonnage of 20,523,706. At the same date Germany possessed 2,090 boats representing a total tonnage of 5,134,720. Of the British tonnage, only 2.9 per cent has been put out of action, either by capture, detention in German ports, or by being held in the Baltic or Black seas. Of the German merchantmen, there have been 1,221 losses, of which 80 have been captured, while the remainder are held up, and the percentage put out of action is 89.3. Practically, all Germany's important vessels have either been captured or put out of action. It may be added that these figures are fully confirmed here by the abundance and cheapness of all the necessaries of life, and the fact that in no single department is there any scarcity of raw material. If this country is as successful in the military and naval spheres as in the commercial and economic, we can desire no better results.

Pig Iron

The position in regard to pig iron shows steady improvement. The first buying movement has for the time being spent itself, and consumers are disposed to wait a little to see to what extent the improvement has been the result of speculation. But their attitude has not checked the rise in prices. Cleveland warrants are now quoted at 51s 7d ($12.38) the rise being about 1s 3d (30c) on the week. Producers now quote a premium of 2s 6d (60c) for forward delivery. Makers are not keen on future business, being very confident that decided improvements may now be looked for. The shipments to date are 50,000 tons. Some restriction on business is resulting from a scarcity of trucks, and difficulties connected with shipments. The Firth of Forth is practically closed to shipping, and Germany's interference with the timber trade with Sweden has checked the stream of shipping to this country, a serious matter, because so many vessels have been in the habit of bringing timber and taking back iron. There are still also great dangers connected with North Sea shipments, which discourage business. Warrant stocks show little variation, the amount now held being 103,000 tons. Business men are satisfied with the state of affairs, in view of the high freight rates. Hematite business has to some extent shared in the improvement, selling prices having advanced on the North East Coast to 65s ($15.60) for mixed numbers. Everything points to higher figures, because ore has become dearer, and coke prices have stiffened. Consumers are getting rather anxious, because the prospects of steel improvement are much brighter than those of iron. The position in regard to ferromanganese will also have a hardening effect on prices. The hemetite improvement has been shared at Barrow-in-Furness owing to a much stronger home demand, and a very large diversion of continental business to this important steelmaking port. The furnaces there are sending the whole of their large output into consumption, and stocks are trifling. More importance is attached to the pig iron improvement, from the fact that it has coincided with the period of the year usually considered the poorest for export business. It should be added that a strong stimulus to the upward movement has come from the very cheerful American reports.

Finished Iron and Steel

The upward movement in finished steel is gaining force. At Sheffield, extensions of plant on a large scale are in progress, at such important works as those of Vickers, Cammell-Laird, Hadfields, and others, while enlargements of smaller works are the rule, rather than the exception. Several furnaces are also being put down to produce Siemens-Martin steel. The shortage is, apparently, due to the enormous consumption for shell-making purposes. The activity is, of course, largely for war purposes, and it is computed that quite three-quarters of Sheffield industrial strength is being devoted in one way or another to the supply of army and navy needs. Railway demands are not at the moment a strong feature, or the boom would attain great proportions. Overtime is the rule throughout Sheffield, except for such trades as silver and electroplate, where there is a shortage of business. The scarcity of labor is being felt more and more every week. A few days ago a large firm of shipbuilders advertised for all sorts of skilled and unskilled men, who are wanted "by the hundreds." Recruiting officers are being told that not another workman must be taken from Sheffield. Otherwise, the problem of supplying the army and navy with material will assume very grave propor-

tions. A fair number of Belgian refugees who happen to be skilled in various branches of automobile work have found employment in that city, and have proved very useful in the present emergency. Motor builders were never so busy. France, Russia and Belgium have all placed orders for motor ambulances of the four-berth description. Enormous number of motor transports and armored motor-cars, motor workshops and kitchens are also being turned out. All this work makes great demands upon high-class steel. Some firms have been obliged to refuse all orders except for government work, and the large demand for machines has proved very useful to the engineering trades.

American Competition

In the rail trade, American competition has been very keenly felt, and it is known that within the last few days some very substantial orders have crossed the Atlantic, some of which have gone to the Canadian mills. The Workington Steel Co. has secured some good lines for the Indian railways, but British rail makers expect to have to concede to America a good deal of the South American business, especially as, according to reports, American railways are not yet placing orders very liberally.

One of the effects of the boom has been an inevitable refusal by Sheffield of a large quantity of cutlery business. This applies especially to the scissor trade, of which a large quantity is on offer, including heavy orders for America. Apparently, the United States and Canada have been very large buyers of cheap German scissors. The Sheffield houses are so busy for the government that they have to refuse a great deal of very desirable outside business. One of the good effects of the war has been to compel Sheffield to solve the problem of supply scissor blanks, or rough forgings, to be made into finished blades.

A few consignments of American and Canadian billets have been received in Sheffield, but so far these are rather "single spies" than "battalions." A few Spanish billets have also been sold in Manchaster. If prices advance here, as seems likely, this should improve the possibility of getting larger quantities of American material. The Sheffield toolmakers are extremely busy, supplying tools to all the allies, and production has been stimulated to the utmost extent. Some very heavy castings have been turned out during the past week, mainly for warship purposes. Apparently, the American prices do not yet offer the substantial advantage to British buyers which appears to be necessary to yield substantial business.

Heavy Decline is Shown

In Deliveries of the Raw Iron Syndicate of Germany —Some Works Busy on War Orders

Amsterdam, Nov. 20.—The Raw Iron Syndicate.—October deliveries from the works showed a heavy decline as compared with the previous month. During August, deliveries were as high as 50 per cent of the normal allotment, whereas during October a percentage of only 40 was attained. The decline is attributed to the fact that consumers took up during September the remainder of the quarter's contracts, thereby accumulating heavy stocks, and naturally refrained as far as possible from purchasing anew at increased prices. The most satisfactory feature of the industry has been the consumption of fine quality brands, required mainly for military work. Business in the Luxemburg products was reported to have improved, the number of blast furnaces in operation having been augmented, and the works produced material in excess of their own actual requirements.

A report from the Siegerland district on the condition of the fine sheet industry has been issued, according to which October has shown an improvement in orders as compared with the preceding month, an increased number of orders having also been received from neutral export markets. Dissatisfaction is, however, expressed at the selling prices, in view of the rise of $1.76¼ per metric ton in the cost of raw material and the increased expense of production brought about by the reduction of output. In the home market, prices have ranged between $29.37½ and $30.55, which figures have also been quoted ex-works for export orders. There appears to have been a quantity of material in the hands of middlemen, as the works prices were continually underquoted. The selling prices realized, even for prompt delivery, were hardly sufficient to cover actual cost of production. The reintroduction of the bounty on exported half- manufactured goods is stated to be of great importance, but the rate is considered to be too low, and the wish is expressed that the Raw Iron Syndicate and the Coal Syndicate would also grant the bounty. The works are stated to be well provided with specifications in all cases where war material is produced.

The pig iron production of Germany and Luxemburg for September is stated to have been 580,087 metric tons, as against 586,661 metric tons in August, 1914, and 1,590,849 metric tons in September, 1913. The total production of pig iron from January to September inclusive was 12,018,940 metric tons, as compared with 14,455,886 metric tons for the corresponding period of 1913.

According to the yearly report of the Rhenish steel works, their producing costs have risen considerably as a result of the much curtailed output, only two to three of their furnaces having been running since the war began. As regards the tube industry, the production has been severely curtailed. In the case of the Mannesmann works, the output, as stated in the annual report, was cut down to about 25 per cent, compared with the normal dimensions prior to the war, and as the chief foreign outlets have since stopped, a recovery of the output will be a slow process.

Russian Iron Trade

Petrograd, Nov. 17.—The prices at Karkoff are as follows: Merchant and hoop iron, 1 rouble, 63 to 68 copecks (82½c to 85c) per pood (36 pounds); girder iron, 1 rouble, 58 to 63 copecks (80c to 82½c); tank iron, 1 rouble, 85 copecks (93½c); roofing iron, 2 roubles, 20 to 25 copecks (112c to 114½c); cast iron, 73 to 74 copecks (36½c to 37c). It will be observed that prices compared with the preceding fortnight remain unchanged. The South Russian Metallurgical Association reports that in the first nine months of the year, the quantity of cast iron smelted in the South Russian iron works was 141,171,970 poods (2,276,967 tons). This compared with corresponding figures last year shows an increase of 769,050 poods (12,404 tons), or 0.5 per cent. This slight increase is explained by the decline in the production during the third quarter; for in the first six months of the year, the quantity smelted was 4,100,000 poods (66,129 tons), or 4.4 per cent more than in the preceding year. Considerably smaller quantities also have been sent onto the market. All the increase in the cast iron produce this year was accounted for in Martin, Bessemer and Thomas billets, etc., of which considerably more was produced than in the corresponding three-quarters of last year. There has been an increase in the production of rails, girders, merchant iron, wire, sheet iron, tyres, etc., to 109,541,180 poods (1,766,793 tons), this year from 105,322,700 poods (1,698,753 tons) last year; in other words, an increase of about 4 per cent.

TIPS FOR NEW BUSINESS

Equipment needs of the Iron and Steel works, Machine shops, Foundries and other Metal Working plants

THE eastern machinery market has been characterized during the past week by the transaction of a considerable volume of business, and by the receipt of numerous inquiries involving machine tool requirements of all kinds. This has come mainly from domestic buyers, but, also, to a considerable extent, from abroad. Considering the near approach of the holiday season, and the long period of dullness which preceded the present comparative activity, there is a really cheerful feeling in the trade and the disposition to expect better things in the future is more marked. The leading event of the week was the appearance of inquiries involving some $20,000 to $25,000 worth of machine tool equipment for the Massillon Rolling Mill Co., Massillon, O. This business, it is expected, will be closed immediately. The board of education, New York City, is putting out a list of 10 or 12 machine tools for a school in Brooklyn; these machines are expected to be closed shortly. The Tropenas Converter Co., 50 Church street, is inquiring for bids on ten 14-inch to 16-inch swing lathes, and twelve 27-inch swing lathes, all for export to France. A Russian exporter in New York is taking bids on twenty 24-inch swing engine lathes for export to Russia. In the business placed from abroad during the week were included a considerable number of lathes of unusually large swing; most of these went to France, while a few went to England. There is a good inquiry from France and Russia for small drilling machines, one inquiry alone involving 50 for shipment to France. An important recent event was the awarding of a 100-ton electric crane by the Public Service Corporation of New Jersey; this went to the Morgan Engineering Co., Alliance, O. The Bethlehem Steel Co. ordered five small cranes from the Pawling & Harnischfeger Co., Milwaukee, for installation in its machine shops. The United Illuminating Co., New Haven, Conn., is about to close on a 200-ton power house crane. The Degnon Construction Co., New York, is about to close on two five-ton hoists. The E. W. Bliss Co., Brooklyn, has made some additional purchases of machine tools, not, however, of the same importance as that company's purchases several weeks ago. The Lake Torpedo Boat Co., Bridgeport, Conn., has bought several machines. S. L. Moore & Sons Corporation, Elizabethport, N. J., has put out an inquiry for a boring mill and will close shortly. Callender & Co., 61 Broadway, New York, have inquired for two second hand automatic screw machines. The Watson-Stillman Co., Aldene, N. J., has bought a radial drill; the Electro Dynamic Co., Bayonne, N. J., in addition to the purchases previously reported, has bought a 3-foot radial drill and a keyseating machine. The Remington Arms Co., Ilion, N. Y., which bought a large quantity of machinery about six weeks or two months ago, is reported as again having entered the market. The board of education, Jersey City, it now is learned, intends to close for the machinery recently inquired for no later than next week.

Some of the more important machine tool dealers at Pittsburgh advise that orders during the last 20 days exceeded those taken in the preceding 60 days, and it generally is conceded that even greater improvement will be noted after Jan. 1. The Youngstown Iron & Steel Co., which is building a new open-hearth steel plant, is expected to ask bids on rolling mill equipment and a number of machine tools within the next fortnight. The Greenville Car Co., Greenville, Pa., has started the erection of a large addition to its plant, previously mentioned by THE IRON TRADE REVIEW, and probably will close negotiations shortly for additional equipment.

In spite of expectations, increases in business still are denied to sellers of machine tools in Chicago. Little benefit has been felt from foreign orders and aside from occasional sales of individual tools nothing has happened to break the monofony of the dull season which has been continued far beyond expectations. Though the field is being canvassed with the greatest care, demand is next to nothing and the larger the concern apparently the less interest it has in new equipment. Some hope is being builded on a probable increase of freight rates.

In Cincinnati, orders for lathes and radial drills continue to come in, principally from foreign sources, with the demand for lathes much in the majority. New orders for milling machines have not been numerous, but manufacturers here are busy on old orders, and both the Cincinnati Milling Machine Co. and the R. K. LeBlond Machine Tool Co. are running full force, and are occasionally working night shifts. The Cincinnati Planer Co. is figuring on more domestic business than for many months, and has taken sufficient orders from foreign fields to operate full in all departments. Among the poorest sellers recently have been shapers, for which there is but little demand from Europe. Heavy sewing machines are being sent to foreign countries in large numbers, and will be used to sew canvas for tents, etc. Domestic business is still a great disappointment, and will probably remain so until the railroads begin buying.

EASTERN STATES

MANCHESTER, N. H. — Amoskeag Mfg. Co. will erect a three-story, 130 x 500-foot bag mill in Manchester; foundation work has been begun.

RUTLAND, VT. — Foundry of the Howe Scale Works was burned, causing about $20,000 loss.

ST. ALBANS, VT.—State board of armory commissioners have selected a site in St. Albans for the erection of a state armory next spring.

SALEM, MASS.—Wm. H. Gove, 254 Lafayette street, will build a four-story, 35 x 213-foot factory building.

SALEM, MASS.—F. A. Delano, owner of the Salem Iron Foundry, Inc., secured a new location and is building a plant off Broadway, near Rose street in South Salem.

WORCESTER, MASS.—J. M. & C. J.

That Christmas Stocking!

AYER & LORD
INTERIOR
Always Easy on the Feet
WOOD BLOCKS

The shop-owner's Christmas stocking is his shop itself. This stocking is *always* hung up.

If *prudent*, as he should be, the shop-owner will watch carefully the *toe* of this stocking, to safeguard himself against holes, else might slip away many of the valuable gifts placed there by "Industry"—the real Santa Claus of the business world.

A well preserved shop stocking means no lost treasures. It means no *delays;* no *expenses;* no *accidents.*

Ayer & Lord Interior Wood Blocks

are the "Holeproof Hosiery" of the shop or foundry!

Let us send you our little booklet "FLOORS"—

IT TELLS WHY.

Ayer & Lord Tie Company

General Office: Railway Exchange, Chicago

CLEVELAND, O.—801 Swetland Bldg. MEMPHIS, TENN.—1402 Exchange Bldg.
KANSAS CITY, MO.—1117 Rialto Bldg. PHILADELPHIA, PA.—319 Perry Bldg.

Buckeley, contractors, are planning a $150,000 plant for the Grocery Baking Co., at Cottage street, Boston.

HIGGANUM, CONN.—Plant of the Cutaway Harrow Co. manufacturer of agricultural implements, was badly damaged by fire; loss about $70,000.

NEW HAVEN, CONN.—United Illuminating Co. will close shortly for a 20-ton crane.

BAY SHORE, N. Y.—Garfield Ice Co., manufacture ice machinery, has been incorporated; $20,000 capital stock; by George H. Wade, Charles F. Rutherford, Adam Rutherford, 1376 St. Marks place, Brooklyn.

BROOKLYN.—Max Trunz, 25 Lombardy street, will build a one-story boiler house addition.

BROOKLYN.—Morse Dry Dock & Repair Co., foot of Fifty-sixth street, has let contracts for construction of a two-story, 42 x 93-foot repair shop.

BROOKLYN.—E. W. Bliss Co., which several weeks ago was reported as a large buyer of machine tools for shrapnel work, has entered the market for a few additional machines.

BUFFALO.—Jewell Steel & Malleable Co. has increased its capital from $50,000 to $200,000.

BUFFALO.—Smith Furnace Co., engines, boilers, and machinery to extract arsenic from minerals, has been incorporated; $100,000 capital stock; by J. M. Briggs, W. J. Wright, W. R. Smith.

CAMDEN, N. Y.—Hydraulic Turbine Corporation has received its charter; $1,000,000 capital stock; Isaac D. West, R. E. Horton, W. E. Lewis, Utica, N. Y.; incorporators.

EDDYVILLE, N. Y.—Almirall & Co., heating, ventilating, and fire extinguishing systems, has been incorporated; $200,000 capital stock; by W. J. Wood, W. C. Adams, J. A. Almirall, 1 Dominick street.

ELMIRA, N. Y.—Fire damaged the foundry at the New York state reformatory.

ITHACA, N. Y.—John Clute and W. E. Leffingwell, Watkins, are at the head of an enterprise to establish a salt plant on the east shore of Gayuga lake.

LONG ISLAND CITY, N. Y.—Ford Motor Co. has let contract for construction of eight-story, 209 x 326-foot service building here.

LONG ISLAND CITY, N. Y.—National Casket Co., 48 Great Jones street, New York, has let the contract for construction of a six-story plant on Jackson street near Bridge Plaza here.

NEWBURG, N. Y.—James F. Templeton & Son, contractors, have commenced work on the addition to the Alberger Pump & Condenser Works, which will be ready early in the spring.

NEW YORK.—Degnon Construction Co. is in the market for two 5-ton hoists.

NEW YORK.—Callender & Co., 61 Broadway, have inquired for two automatic screw machines.

NEW YORK.—Long Island Lighting Co. has increased its capital from $300,000 to $1,000,000.

NEW YORK.—Norwich Gas & Electric Co. has increased its capital from $100,000 to $2,000,000.

NEW YORK.—Rogers Wire Works have been incorporated; $300,000 capital stock; by W. S. Gordon, R. and C. D. W. Rogers, Larchmont, N. Y.

NEW YORK.—Clar Lux Mfg. Co., novelties, electrical appliances, has been incorporated; $15,000 capital stock; by Marion C. Clement, J. J. Ryan, R. T. Gee, Buffalo.

NEW YORK.—Great Northern Construction Co. has been incorporated; $15,000 capital stock; by Benjamin North, Harry and Joseph Falk, 720 West 181st street.

NEW YORK.—National Safety Train Control & Signal Co. has been incorporated; $10,000 capital stock; by N. Newsome, F. W. Morton, N. B. Marshall, 10 West 132nd street.

NEW YORK. — New Denver Ford Starter Corporation has received its charter; $20,000 capital stock; by T. J. McGovern, M. L. Effinger, J. Robinson-Duff, 35 Broad street, incorporators.

NEW YORK.—Seaboard Mills, Inc., textiles, has been incorporated; $100,000 capital stock; by Henry Audley, Thomas A. O'Callaghan, both of White Plains, N. Y.; Harley L. Stowell, 37 Fifth avenue, New York City.

NEW YORK.—Tropenas Converter Co., 50 Church street, has inquired for 10 lathes, 14 to 16-inch swing and six to seven feet between centers, and 12 27-inch swing lathes, for export to France.

NEW YORK.—Operaphone Mfg. Corporation, phonographs and records, has received its charter; $100,000 capital stock; John Fletcher, Alcahel Naughton, Edmund F. Gerner, 210 East Eighty-sixth street, incorporators.

NEW YORK.—The board of education here will ask for bids in a week or so on a large number of machine tools for installation in one of the Brooklyn public schools; it is expected that orders will be placed within two weeks after the inquiries appear.

SYRACUSE, N. Y.—Resilient Steel Wheel Co. has been incorporated; $25,000 capital stock; by F. A. and C. Leonard, J. M. Greman.

SYRACUSE, N. Y.—Crescent Calk Corporation, horse shoes, machinery, has received its charter; $100,000 capital stock; H. Hendrickson, J. D. Sweet, J. V. Hemstreet, Herkimer, N. Y.; incorporators.

McKEESPORT, PA. — Williamson-Johnston Co., capital $50,000, has been incorporated in Delaware, to manufacture and install all kinds of electrical appliances; incorporators are, George S. Williamson, Arthur T. Johnston and Herman Marwitz, all of this city.

NEW CASTLE, PA. — The New Castle Lodge of Perfection contemplates the erection of a $150,000 stone lodge.

PITTSBURGH.—The Scranton Life Insurance Co. contemplates the erection of a 12-story building on Spruce street.

PITTSBURGH.—The city engineer estimates the cost of a proposed bridge over East street from Perrysville avenue and Charles street, at $70,000.

PITTSBURGH. — The board of education of Carrick, a suburb, is contemplating the erection of a high school building; the site has not yet been chosen.

PITTSBURGH.—J. G. Chalfant, county engineer, has plans for a truss bridge to be erected at Glenshaw, a suburb, on the Butler Short Line railroad; the Penn Bridge Co., Beaver Falls, Pa., will erect the structure.

WASHINGTON, D. C.—Bids will be taken shortly on two 1-ton hand cranes for the Panama canal.

Xmas Plum Pudding by a Business Cook

Select about a half dozen good tips; mix with a like portion of products; add a quantity of ginger; a dash of energy; season with spicy arguments; stir continuously, then watch results.

Here are some selected tips, and don't forget—

KEEP STIRRING.

Bids will be let shortly for steel, involving about 700 or 800 tons, for the proposed 14-story Garfield Hotel at Superior avenue and East Ninth street, Cleveland. Construction will begin April 1. H. L. Stevens & Co., architects, 910 South Michigan avenue, Chicago, have drawn plans and will establish offices in Cleveland for the supervision of bids and construction.

Youngstown Iron & Steel Co., Youngstown, O., which is building a new plant, probably will ask bids on rolling mill equipment, including mills, tables, etc., within the next two weeks. Julian Kennedy, Pittsburgh, is the engineer in charge.

Scranton Life Insurance Co. contemplates the erection of a 12-story building on Spruce street, Pittsburgh.

Buckeye Engine & Machine Co., Joliet, Ill., soon will be in the market for a horizontal cylinder boring machine and will furnish blue prints of the cylinders to the interested tool builders.

It is expected that a considerable demand for new machinery will develop shortly as the result of the fire which damaged the Edison plants, East Orange, N. J., last week. About 15 per cent of the machinery in the plants was destroyed.

Massillon Rolling Mill Co., Massillon, O., has put out inquiries for from $20,000 to $25,000 worth of machine tool equipment and is expected to close shortly.

Degnon Construction Co., New York City, is in the market for two five-ton hoists.

The state board of health has been asked to approve plans for a $432,000 filtration plant at Zanesville, O. Chester & Fleming, Union Bank building, Philadelphia, are engineers.

McKinney Tractor Co., Belleville, Ill., advises the construction of its 80 x 200-foot factory will be completed within the next 60 or 90 days. It is in the market for steel sash, structural steel, and also will need extra machinery.

Ford Motor Co. has secured a site and will erect an assembling plant at Louisville, Ky., in the near future. The Detroit office should be addressed.

Tropenas Converter Co., 50 Church street, New York City, has inquired for 10 lathes, 14 to 16-inch swing and 6 to 7 feet between centers, and 12 27-inch swing lathes, for export to France.

CENTRAL STATES

GARY, IND.—Robert D. Wynn and E. O. Linton, both of Waukegan, Ill., soon will erect a plant in Gary for the manufacture of water distillers.

PONETO, IND.—Farmers' Elevator Co., milling and elevator, has been incorporated; $20,000 capital stock; by William A. Popejoy, W. A. Huffman, J. W. Cook, et al.

RICHMOND, IND.—Preliminary plans for the 100-foot south side bridge will be supplied to the county commissioners about Jan. 1.

BELLEVILLE, ILL. — McKinney Tractor Co., (previously mentioned), advises the construction of its 80 x 200-foot factory will be completed within the next 60 or 90 days, and it is in the market for steel sash, structural steel, and also will need extra machinery.

BLOOMINGTON, ILL.—Manufacturer's Ice

& Cold Storage Co. will erect a $12,000, 37 x 75-foot, brick plant containing 3,500 feet of 2-inch ammonia pipe and to be equipped with a one-ton electric elevator; Herman W. Fifer, manager.

JOLIET, ILL.—Buckeye Engine & Machine Co. soon will be in the market for a horizontal cylinder boring machine and will furnish blue prints of the cylinders to those who manufacture machines of that type.

ROCKFORD, ILL.—Burd High Compression Ring Co., manufacturer of piston rings, machinery, etc., has been incorporated; $50,000 capital stock; A. A. Hyer, attorney, Rockford.

CHARLESTON, W. VA.—Cullen & Vaugh Co., Hamilton, O., are low bidders for the erection of a $118,328 high school building; Frank L. Packard, Columbus, O., is the architect in charge.

LOUISVILLE, KY.—John H. Rightmeyer is negotiating with a new company for the establishment of a foundry in Louisville, but declines to give the name of the company until negotiations are terminated.

BAD AXE, MICH.—Huron Implement Co., recently organized with $20,000 capital stock, has started on the construction of a factory for the manufacture of cultivators; Thomas McEwing, president, Lansing, Mich.

DETROIT.—Fisher Body Co. will build a $40,000, brick, steel and concrete addition to its plant on Piquette avenue.

DETROIT.—Cadillac Can Co. has been incorporated $12,000 capital stock; by Frank and Ida M. Knupfer, Duncan and Ester Walker, Henry B. Graves.

MT. MORRIS, MICH.—City has abandoned the plan of establishing a municipal electric light plant, and has granted a franchise to the Flint Electric Co.

ASHLAND, WIS.—The Bartles independent oil interests of Milwaukee and St. Paul have organized the Bartles-Dadmun Oil Co. of Ashland, Wis., and will establish a tank and warehouse system here; about $12,000 will be invested; John P. Dadmun is manager.

BAYFIELD, WIS.—County highway commissioner is preparing to take bids for the construction early next year of five I-beam and plate girder bridges; M. W. Torkelson, Madison, is state bridge engineer.

MARINETTE, WIS. — Contracts for the erection of the new Marinette high school were awarded as follows: General contract, Bailey, Marsh & Co., Minneapolis, Minn., $95,000; heating and ventilating, General Heating & Ventilating Co., Milwaukee, $17,600; plumbing, City Plumbing Co., Omaha, Neb., $5,900.

MILWAUKEE, WIS.—Martin Tullgren & Son, architects, are about ready for bids for erecting and equipping a $100,000 apartment house at Twenty-first street and Grand avenue, on their own account; the building will be three stories, 90 x 200 feet, with elevators.

MILWAUKEE, WIS.—C. H. & E. Mfg. Co., gasoline engines, concrete mixers, portable sawrigs, etc., will erect a $30,000 factory and machine shop of its own during the winter; contracts have been awarded for a brick and steel building, 100 x 100 feet, two stories, at Clinton and Mineral streets.

MILWAUKEE, WIS.—C. H. & E. Mfg. Co., gasoline engines, portable sawrigs and power equipment, has awarded contracts for the erection of its $25,000 machine shop and factory at Clinton and Mineral streets; it will be two stories, 100 x 100 feet, of fireproof construction.

MILWAUKEE, WIS.—H. O. Seymour, general manager, Wisconsin Telephone Co., 183 Fifth street, announces that work on the $200,000 addition to Main exchange, 420-426 Broadway, and the proposed $40,000 Mitchell exchange, Milwaukee, will begin immediately after Jan. 1; plans have been completed by A. C. Eschweiler, architect. The Main addition will be of steel, brick and terra cotta, 10 stories; this project was reported several months ago, but has been delayed six months.

NEENAH, WIS.—Jersild Fire Escape Co. has been incorporated; $100,000 capital stock; by J. N. Jersild, N. C. Jersild, E. M. Jersild, H. Jersild.

OSHKOSH, WIS.—Plans are being prepared by Henry Auler, architect, Oshkosh, for the proposed central light, heat and power plant to be erected at Oshkosh high school and serve three large public institutions.

OSHKOSH, WIS.—Architects William Waters and Henry Aulers are completing plans for the proposed $175,000 Oshkosh high school, to be erected early next year; it will be three stories, 78 x 144 feet, of reinforced concrete, brick and steel construction; call for bids is expected soon.

PLYMOUTH, WIS.—C. F. Kado Fixture Co. wood and metal store fixtures, display stands, etc., is planning to erect two additional buildings during the winter; the capital stock has just been increased from $35,000 to $75,000.

WAUKESHA, WIS.—Waukesha Spring Water Ice Co. has been incorporated with $50,000 capital stock by C. E. Armin, J. S. Hoffman and R. J. Gaul to establish an artificial ice plant. It is planned to start shipping April 15.

WAUSAU, WIS. — Local capitalists are forming a $250,000 corporation to establish and operate a co-operative packing and refrigerating plant at Wausau. Already subscriptions to the amount of $120,000 have been obtained.

SOUTHERN STATES

NORFOLK, VA.—Fire slightly damaged the Old Dominion Iron Works on Pearl street.

NORFOLK, VA.—Berkley Machine Co. has been incorporated; $60,000 to $70,000 capital stock; R. B. Wood, president, Portsmouth, Va.; E. A. Clark, secretary-treasurer, Campostella Heights, Va.

TUSCALOOSA, ALA.—Guest Rotary Engine Co. has been incorporated; $1,000 capital stock; by W. T. Guest, M. C. Rennley, P. B. Green.

MONROE, LA.—Monroe & Texas Railroad Co., capitalized at $250,000, has filed a charter at the clerk's office for the right to build a road from a point at or near Monroe, through the parishes of Ouachita, Jackson, Wimm, Natchitoches, into Texas.

NEW ORLEANS.—The foundry warehouse of the Debert, Bancroft & Ross Co., Ltd., was badly damaged by fire; loss to building and patterns about $18,000.

WESTERN STATES

LEAVENWORTH, KAN. — Fire did about $10,000 damage to the pattern department of the Great Western Mfg. Co.

CHOUTEAU, MONT.—Teton county commissioners have deferred action until early in the spring in regard to four proposed bridges, the plans for which are being prepared.

HELENA, MONT.—Helena Milling Co. has been incorporated to build and operate a flour mill in Helena; $50,000 capital stock; by C. G. Evans, et al.

RED LODGE, MONT.—It is reported the Amalgamated Copper Co. has purchased a site near Laurel for the construction of a smelter and plan construction of a railroad to Cooke City mining district.

AMERICAN FALLS, IDA. — American Falls & Rockland Valley Railroad Co. has been incorporated to build a railroad from American Falls to Roy, a distance of 35 miles; $650,000 capital stock; by J. Slifer, Chicato, Idaho, et al.

COEUR d'ALENE, IDA.—Staub Pulp, Paper & Lumber Co., which plans the construction of a sawmill and pulp mill at Libby, Mont., plans to convert the Coeur d'Alene brewing plant into a paper mill; E. E. Staub and others are interested.

KAMIAH, IDA.—Northern Pacific Railway Co. will begin at once the construction of a steel bridge over the Clearwater river at this point.

WALLACE, IDAHO.—Wallace Powder Co., manufacturer, has been incorporated; $25,000 capital stock; by Eugene R. Day, Ellis L. Hale, James F. McCarthy.

DAVENPORT, WASH. — Repairing of grade on the Blusten-Columbia branch of the Great Northern, 28 miles long, has been started preparatory to laying steel in the spring.

HOQUIAM, WASH.—It is announced by W. C. Albee, superintendent of buildings and bridges for the Northern Pacific Railway Co., that contract for steel superstructure for bridge here will be awarded shortly.

INDEX, WASH.—Fire badly damaged the Index Galena shingle mill, which is to be rebuilt; mill had four upright machines and a hand machine.

SEATTLE.—Seattle Ship & Engine Building Co. has been incorporated; $50,000 capital stock; by Sydney H. McLane, John L. Anderson, James Campbell.

SEATTLE.—A consul general in the far east is advised that provincial authorities desire a suction or bucket dredge to be used in deepening a lake; further information may be had from W. B. Henderson, bureau of foreign and domestic commerce, Alaska building, Seattle; refer to No. 14602.

SEATTLE.—Contract for the 90-foot gasoline tender for use by the Uyak plant on Kodiak island has been awarded by the Northwestern Fisheries Co., L. C. Smith building, to E. W. Heath, Seattle. Bids are being taken on a 120-foot steam stern wheeler for use in connection with the Orcas cannery in the Copper river district; estimated cost, $35,000.

SEATTLE.—A merchant of good standing has requested the American consul to place him in touch with American manufactures of dynamos, transformers, switchboards, motor and materials for electrical installations, such as lamps, insulating tubing, electroliers, electric heaters, water boilers and general domestic appliances. Refer to No. 14618. A company in Europe wishes to correspond with American manufacturers of water, steam and boiler pipes, galvanized brass and copper pipes. Refer to No. 14623. For further information address W. B. Henderson, bureau of foreign and domestic commerce, Alaska building, Seattle.

SPOKANE, WASH.—Contract for heating, plumbing and installation of power plant for the $600,000 hotel being erected by the Great Northern Railway Co. at Many Glaciers Lake, in Glacier National Park, has been awarded to the James Smith Plumbing Co., Spokane, at $80,000.

TACOMA, WASH.—Pacific Iron & Steel Co. plan to spend $50,000 for the purpose of adding furnaces to its plant, erecting a building and adding machinery.

EUGENE, ORE. — County commissioners are planning a steel bridge, to have a 253-foot span, at Coast Fork, Ore.

PORTLAND, ORE.—Henninger & Ayers Mfg. Co., machinery, has been incorporated; $20,000 capital stock; by W. A. Henninger, et al.

PORTLAND, ORE.—Western Sheet Metal Works has been incorporated; $5,000 capital stock; by E. L. McDougall, F. C. McDougall, R. P. Hurst.

HUNTINGTON BEACH, CAL.—La Bolsa Tile Co. will enlarge its plant and install additional machinery for the manufacture of roofing tile and bell pipe.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Delivery to April 1.)

Bessemer, valley	$13.75 to 14.00
Bessemer, Pittsburgh	14.70 to 14.95
Basic, Pittsburgh	13.45 to 13.60
Basic, eastern Pa.	13.50
Malleable, Pittsburgh	13.70 to 13.95
Malleable, Chicago	13.00 to 13.50
Malleable, Philadelphia	14.50 to 15.00
Malleable, Buffalo	13.00 to 13.25
No. 1X, Philadelphia	14.75 to 15.00
No. 2 foundry, Pittsburgh	13.70 to 13.95
No. 2 foundry, Cleveland	13.25 to 13.50
No. 2 foundry, Ironton	12.75
No. 2 foundry, Chicago	13.00 to 13.50
No. 2X foundry, Philadelphia	14.25 to 14.50
No. 2X fdy., (N. J. tidewater)	13.75
No. 2X foundry, Buffalo	13.00 to 13.25
No. 2 plain, Philadelphia	14.00 to 14.25
No. 2 plain, (N. J. tidewater)	13.75 to 14.00
No. 2 plain, Buffalo	12.75 to 13.00
No. 2 southern, Birmingham	9.75
No. 2 southern, Cincinnati	12.65
No. 2 southern, Chicago	13.75 to 14.00
No. 2 southern, Phila delivery	14.50
No. 2 southern, Cleveland	13.75 to 14.00
No. 2 south'n, New York, docks	14.00 to 14.25
No. 2 southern Boston, docks	14.00 to 14.25
No. 2 south'n, interior New Eng.	15.00 to 16.00
No. 2 southern, St. Louis	14.00 to 14.25
Virginia No. 2X furnace	12.25 to 12.75
Virginia 2X, Philadelphia	15.00 to 15.25
Virginia 2X, Jersey City	15.25 to 15.50
Virginia 2X, Boston points	15.50 to 15.75
Gray forge, (eastern Pa.)	13.50 to 13.75
Gray forge, Pittsburgh	13.45 to 13.70
Gray forge, Birmingham	9.00 to 9.50
Silveries, 8 per cent, Cleveland	17.63
Silveries, 5 per cent Birmingham	12.50
Silveries, 5 per cent, Chicago	16.35
Standard low phos., Phil.	19.00 to 20.00
Lebanon low phos., furnace	16.00 to 16.50
Low phos., Pittsburgh	20.95 to 21.20
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	15.75 to 16.50
Charcoal, Buffalo	15.75 to 16.75
Charcoal, Birmingham	25.00

IRON ORE

(Lower lake ports.)

Old range Bessemer, 55 per cent	$3.75
Mesabi Bessemer, 55 per cent	3.50
Old range, non-Bess., 51½ per cent	3.00
Mesabi non-Bessemer, 51½ per cent	2.85

(Per unit Philadelphia.)

Foreign Bess., 50 to 65 per cent	7c
Foreign non-Bess., 50 to 65 per cent	7c

COKE

(At the ovens.)

Connellsville furnace	$1.60 to 1.75
Connellsville fur. contr.	1.70 to 1.75
Connelleville foundry	2.00 to 2.40
Connellsville fdy., contr.	2.25 to 2.50
Wise county furnace	1.75 to 2.00
Wise county foundry	2.10 to 2.40
Pocahontas furnace	1.75 to 2.00
Pocahontas foundry	2.00 to 2.25
New River, foundry	2.50 to 3.00
New River, furnace	2.00 to 2.25

FERRO-ALLOYS

Ferro-manganese, Baltimore	$68.00
Ferro-silicon, 50 per cent, Pbgh.	$71.00 to 73.00
Ferro-silicon, 50 per cent, Phila.	71.00 to 73.00
Ferro-sil., 12 to 13 per cent, Pgh.	22.90
Ferro-sil., 11 to 12 per cent, Pgh.	21.90
Ferro-sil., 10 to 11 per cent, Pgh.	20.90
Ferro-sil., 9 to 10 per cent, Pgh.	19.90
Ferro-carbon titanium, carloads, per lb.	8c to 12½c

SEMI-FINISHED STEEL

Open-hearth billets, Phila	$21.40 to 21.90
Forging billets, Phila	24.40 to 25.40
Forging billets, Pbgh. (nom.)	24.00 to 24.50

Freight Rates via Panama Canal

Rates on finished materials, including plates, shapes, bars, wire, nails, etc., to Pacific coast points via Panama Canal, per 100 lbs., in carload lots, exclusive of insurance and dockage.

From New York	$0.25
From Pittsburgh	.41
From Youngstown	.43
From Niles	.43
From Wheeling	.41
From Steubenville	.41
From Johnstown	.395
From Coatesville	.34
From Steelton	.35
From Bethlehem	.325
From Cleveland	.44
From Chicago	.55

Wire rods, Pittsburgh	$25.00
Billets, Pbgh. and Ygnst.	18.50 to 19.00
Sheet bars, Pbg. and Ygnst.	19.00 to 19.50

RAILS AND TRACK MATERIAL

Stand. Bess., rails, Pbgh	1.25c
Stand. open-hearth rails, Pbgh.	1.34c
Lgt. rails, 8 lbs., Pbgh. & Chgo.	1.22c
Lgt. rails, 12 lbs., Pbgh. & Chgo.	1.17c
Lgt. rails, 16 to 20 lbs., Pbgh. & Chgo.	1.12c
Lgt. rails, 25 to 45 lbs., Pbgh., and Chgo.	1.07c
Relaying rails, standard, Pbgh. & Chgo.	$23.00 to 24.00
Relaying rails, light, Chicago	21.50 to 22.50
Angle bars, st. sect. Pbgh. base.	1.50c
Angle bars, st. sections, Chgo.	1.50c
Spikes, railroad, Pbgh.	1.35c to 1.40c
Spikes, railroad, Chgo.	1.50c
Track bolts, Pbgh.	2.00c
Track bolts, Chgo.	2.00c

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$ .95
Newark, N. J.	2.85
New England	2.85
Philadelphia	2.65
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.20
New England (all rail)	2.45
New York and Brooklyn (all rail)	2.45
New York and Brooklyn (by canal)	1.00 to 1.50
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York docks (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York (rail and water)	4.25
Philadelphia (all rail)	5.20
Philadelphia (rail and water)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.47
Omaha	3.58
St. Louis	1.58
Ironton, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

SHAPES, PLATES AND BARS

Structural shapes, Pittsburgh	1.05c to 1.10c
Structural shapes, Chicago	1.19c to 1.29c
Structural shapes, Philadelphia	1.20c to 1.25c
Structural shapes, New York	1.21c to 1.26c
Structural shapes, San Francisco	2.10c to 2.05c
Tank plates, Chicago	1.19c to 1.29c
Tank plates, Pittsburgh	1.05c to 1.10c
Tank plates, Philadelphia	1.20c to 1.25c
Tank plates, New York	1.21c to 1.26c
Bars, soft steel, Pittsburgh	1.05c to 1.10c
Bars, soft steel, Chicago	1.19c to 1.29c
Bars, soft steel Philadelphia	1.25c to 1.30c
Bars, soft steel, New York	1.26c to 1.31c
Hoops, carloads, Pittsburgh	1.25c
Hoops, less carloads, Pittsburgh	1.30c
Bands, Pittsburgh	1.10c
Shafting, carloads, Pbgh., disc. contract	66 to 67
Shafting, less carl'ds, Pbgh., disc.	63
Bar iron, Chicago	0.95c to 1.00c
Bar iron, Philadelphia	1.12c to 1.19c
Bar iron, New York	1.10c to 1.15c
Bar iron, Cleveland	1.15c
Bar iron, Pittsburgh	1.15c
Hard steel bars, Chicago	1.25c to 1.30c
Smooth finish. mchy. steel, Chi.	1.68c

SHEETS AND TIN PLATE

No. 28, black, Pittsburgh	1.80c
No. 28, black, Chicago	1.99c to 2.09c
No. 28, tin mill, black, Pbgh.	1.85c
No. 28, galvanized, Pbgh.	2.80c
No. 28, galvanized, Chgo.	2.89c to 2.99c
No. 10, blue, annealed, Pbgh.	1.35c
No. 10, blue, annealed, Phila.	1.45c to 1.50c
Tin plate, 100 lb., coke base	$3.20

EXTRAS FOR SHEET OR TIN MILL SPECIFICATIONS

(Per hundred pounds.)

Single pickled, cold roll., and re-an.	30 cents
Hot roll'd, pickl'd and ann., tin mill	25 cents
Full pickl'd, cold rolled and re-ann.	50 cents
Auto sheets	75 cents
Blued stove pipe stock	10 cents
Range steel	30 cents
Re-squaring	10 cents
Roller levelling	10 cents
Patent levelling and re-squaring	35 cents
Oiling sheets	10 cents
Deoxidizing	10 cents
Lime finish	10 cents
Open-hearth stamping steel, free from mill scale	55 cents
Special open-hearth deep stpg. steel free from mill scale	80 cents
Extra deep special auto body stock	$1.25
Ext. for 28 gage ov. 32 to 36-in. wide	10 cents

No reduction for sheets not annealed.

The above extras apply on both sheet and tin mill specifications, at the same rate.

IRON AND STEEL PIPE

(Pittsbugh.)

	Black Butt-weld.	Galv.
Steel, ¾ to 3 inches	81	72½
Iron, ¾ to 2½ inches	70	61
	Lap-weld.	
Steel, 2½ to 6 inches	80	71½

BOILER TUBES

Steel, 3½ to 4½ inches	73
Iron, 3½ to 4½ inches	60

WIRE PRODUCTS

Wire nails, jobbers, Pittsburgh	$1.50
Wire nails, retailers, Pittsburgh	1.55
Plain wire, jobbers, Pittsburgh	1.30
Plain wire retailers, Pittsburgh	1.35
Galvanized wire, jobbers, Pbgh.	1.70
Galvanized wire, retailers, Pbgh.	1.75
Polished staples, Pbgh.	1.50
Galvanized staples, Pbgh.	1.90
Barb wire, painted, jobbers, Pbgh.	1.50
Barb wire, painted, retailers, Pbgh.	1.55
Barb wire, galv., retailers, Pbgh.	1.95
Barb wire, galv., jobbers, Pbgh.	1.90

IRON AND STEEL PRICES

Corrected up to Tuesday noon

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled threads, 80 and 20; cut threads 80 and 15; larger or longer, 75 to 15.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or shorter, rolled, 80 and 25; cut, 80 and 20; larger or longer, 80.

Gimlet and cone point lag or coach screws, 80 and 25.

Hot pressed square, blank or tapped nuts, $6.30 off list; hot pressed hexagon blank or tapped, $7.20 off.

Cold pressed, c. and t. square, blank or tapped, $6 off; hexagon, blank or tapped, ⅝ inch and larger, $7.20; ⅞-inch and smaller, $7.80.

RIVETS

Structural rivets, Pbgh	1.45c to 1.50c
Structural rivets, Chgo	1.68c
Boiler rivets, Pbgh	1.55c to 1.60c
Boiler rivets, Chgo	1.78c

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	1.55c to 1.60c

COLD ROLLED STRIP STEEL

(Subject to regular extras.)

Base price Cut to length Hard.	Soft.	0.10 to 0.19 Cabon 1½ in. and wider.
2.85	3.10	0.100 and thicker.
2.95	3.20	0.050 to 0.099 inc.
3.10	3.35	0.035 to 0.049 inc.
3.35	3.75	0.031 to 0.034 inc.
3.60	4.00	0.025 to 0.030 inc.
3.80	4.20	0.020 to 0.024 inc.
4.70	5.20	0.017 to 0.019 inc.
5.10	5.60	0.015 and 0.016
5.95	6.45	0.013 and 0.014
6.55	7.05	0.012
6.90	7.40	0.011
7.25	7.75	0.010
Coils		
2.75	3.00	0.100 and thicker
2.80	3.05	0.050 to 0.099 inc.
2.95	3.20	0.035 to 0.049 inc.
3.10	3.50	0.031 to 0.034 inc.
3.20	3.60	0.025 to 0.030 inc.
3.30	3.70	0.020 to 0.024 inc.
3.60	4.10	0.017 to 0.019 inc.
4.00	4.50	0.015 and 0.016
4.70	5.20	0.013 and 0.014
5.05	5.55	0.012
5.40	5.90	0.011
5.75	6.25	0.010

CAST IRON PIPE

Three to 20 in., Cleveland	$21.50
Twenty-four to 48-inch, Cleveland	21.00
Four-inch, water, Chicago	26.00
Six to 12 inches, Chicago	24.00
Larger sizes, Chicago	23.50
Six-inch, water, New York	20.00 to 20.50
Four-inch, water, Birmingham	19.50
Six-inch and larger, Birmingham	19.50
Gas pipe, $1 per ton higher than water.	

WAREHOUSE PRICES

Steel bars, Chicago	1.65c
Steel bars, Cleveland	1.80c
Steel bars, Cincinnati	1.70c to 1.85c
Steel bars, Philadelphia	1.70c to 1.75c
Steel bars, New York	1.80c
Steel bars, St. Louis	1.70c
Iron bars, Chicago	1.65c
Iron bars, Cleveland	1.75c
Iron bars, St. Louis	1.65c
Iron bars, Cincinnati	1.65c to 1.75c
Iron bars, Philadelphia	1.70c
Iron bars, New York	1.65c to 1.70c
Hoops, Chicago	2.15c
Shapes and plates, Chicago	1.75c
Shapes and plates, Cleveland	1.90c
Shapes and plates, Cincinnati	1.80c to 1.90c
Shapes and plates, St. Louis	1.80c
Shapes and plates, Philadelphia	1.70c to 1.75c
Shapes and plates, New York	1.85c
No. 10 blue ann. sheets, Chgo	1.95c
No. 10 blue ann. sheets, Cleve	2.05c
No. 10 blue ann. sh., St. Louis	2.00c
No. 10 blue ann. sheets, Cinci	1.95c
No. 28 black sheets, Chgo	2.55c
No. 28 black sheets, Cleveland	2.45c
No. 28 black sheets, Cincinnati	2.45c to 2.55c
No. 28 black sheets, St. Louis	2.55c
No. 28 galv. sheets, Chgo	3.55c
No. 28 galv. sheets, Cleveland	3.35c
No. 28 galv. sheets, Cincinnati	3.40c to 3.55c
No. 28 galv. sheets, St. Louis	3.55c

Freight Rates, Coke

Connellsville regions, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.70
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

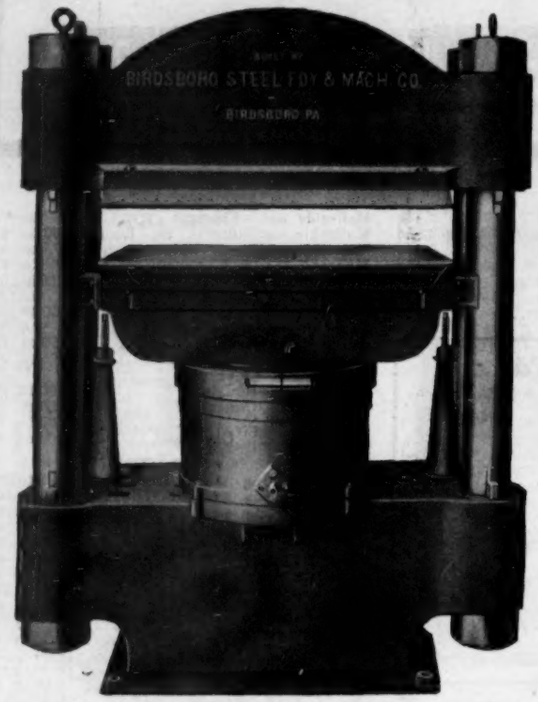
No. 1 railroad wrought, Chgo	$ 7.75 to 8.00
No. 1 railroad wrought, Cleve	9.00 to 9.50
No. 1 railroad wrought, St. L	7.50 to 7.75
No. 1 railroad wrought, Cincin	8.00 to 8.50
No. 2 railroad wrought, Chgo	7.25 to 7.75
No. 2 railroad wrought, St. L	7.25 to 7.50
Arch bars and transoms, Chgo	10.50 to 11.00
Arch bars and transoms, St. L	10.50 to 11.00
Knuckles, coup. & sp'gs, Chgo	8.75 to 9.00
Knuckles, coup. & spr'gs, St. L	8.50 to 8.75
Shafting, Chicago	11.50 to 12.00
Shafting, St. Louis	10.50 to 11.00
Steel car axles, Chicago	10.50 to 11.00
Steel car axles, St. Louis	10.50 to 11.00
Locomotive tires, Chicago	9.00 to 9.50
Locomotive tires, St. Louis	8.50 to 9.00
Cut forge, Chicago	7.25 to 7.75
Pipes and flues, Chicago	5.75 to 6.25
Pipes and flues, Cleveland	6.75 to 7.00

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 pounds to:—

New York	16 cents
Philadelphia	15 cents
Boston	18 cents
Buffalo	11.6 cents
Baltimore	14½ cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Minneapolis and St. Paul	32.9 cents
Denver	68.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast, (all rail)	80 cents
Pacific coast, via Panama canal	41 cents

Pipes and flues, St. Louis	5.50 to 5.75
No. 1 cast, C icago	9.00 to 9.25
No. 1 cast, Cleveland	9.50 to 10.00
No. 1 cast, Cincinnati	8.50 to 9.00
No. 1 cast, St. Louis	9.00 to 9.25
No. 1 busheling, Chicago	6.75 to 7.00
No. 1 busheling, Cleveland	8.00 to 8.25
No. 1 busheling, Cincinnati	5.75 to 6.25
No. 1 busheling, St. Louis	7.25 to 7.50
No. 2 busheling, Chicago	5.75 to 6.00
No. 1 boiler plate, cut, Chgo	5.50 to 5.75
No. 1 boiler plate, cut, Buffalo	9.00 to 9.50
No. 1 boiler plate, cut, St. L	5.50 to 5.75
Boiler punchings, Chicago	8.25 to 8.75
Cast borings, Chicago	4.75 to 5.00
Cast borings, Cleveland	5.50 to 5.75
Cast borings, Cincinnati	4.25 to 4.75
Cast borings, St. Louis	4.00 to 4.50
Machine shop turnings, Chicago	4.75 to 5.00
Machine shop turnings, Cleveland	5.00 to 5.25
Machine shop turnings, Cinci	4.25 to 4.75
Machine shop turnings, St. L	4.50 to 5.00
Malleable agl., Chicago	7.50 to 7.75
Malleable agricultural, St. Louis	6.00 to 6.25
Malleable, railroad, Chicago	7.75 to 8.25
Malleable, railroad, Cincinnati	6.50 to 7.00
Malleable, railroad, St. Louis	6.25 to 6.50
Angle bars, iron, Chicago	10.00 to 10.00
Angle bars, iron, St. Louis	9.50 to 10.00
Angle bars, steel, Chgo	7.75 to 8.00
Angle bars, steel, St. Louis	8.50 to 8.75
Stove plate, C icago	8.25 to 8.50
Stove plate, Cleveland	7.50
Stove plate, Buffalo	9.00 to 9.75
Stove plate, Cincinnati	6.50 to 7.00
Stove plate, St. Louis	7.00 to 7.25
Bundled sheet, Cincinnati	4.00 to 4.50
(Gross Tons.)	
Heavy melting steel, Pbgh	$10.25 to 10.75
Heavy melting steel, Buffalo	10.00 to 10.50
Heavy melting steel, Chicago	8.00 to 8.50
Heavy melting steel, Cleveland	9.00 to 9.50
Heavy melting steel, Cincinnati	9.00 to 9.50
Heavy melting steel, eastern Pa.	9.00 to 9.50
Heavy melting steel, New York	7.50 to 7.75
Heavy melting steel, St. Louis	10.50 to 11.00
Bundled sheet, Buffalo	6.25 to 6.50
Grate bars, Buffalo	9.00 to 9.25
Grate bars, New York	6.50 to 7.00
No. 1 railroad wrought, east. Pa.	11.00 to 11.50
No. 1 railroad wrought, Pbgh	10.00 to 10.50
No. 1 R. R. wght., New York	9.00 to 9.50
No. 1 R. R. wrought, Buffalo	10.00 to 10.50
Shafting, New York	11.00 to 11.50
Shafting, eastern Pa.	13.50 to 14.00
Wrought pipe, New York	7.25 to 7.50
Wrought pipe, eastern Pa.	9.25 to 9.75
Mch. shop turnings, New York	5.00 to 5.25
Machine shop turnings, Buffalo	5.50 to 6.00
Mch. shop turnings, Pbgh	7.50 to 8.00
Mch. shop turnings, eastern Pa.	7.50 to 7.75
Cast borings, New York	5.00 to 5.25
Cast borings, eastern Pa.	7.50 to 8.00
Cast borings, Buffalo	6.00 to 6.50
Cast borings, Pittsburgh	8.00 to 8.50
Stove plate, (Jersey points)	8.00 to 8.50
Stove plate, Pittsburgh	8.50 to 8.75
Stove plate, eastern Pa.	8.50 to 9.00
Shoveling steel, Chicago	8.00 to 8.50
Shoveling steel, St. Louis	8.00 to 8.50
Reroll'g rails, 5 ft. & ov., Pbgh.	11.50 to 11.75
Reroll, rails, 5 ft. & ov., C go.	9.50 to 9.75
Reroll, rails, 5 ft. & ov., Cleve.	11.00 to 11.50
Reroll. rails, 5 ft. & ov., E. Pa.	10.50 to 11.00
Reroll. rails, 5 ft. & ov., St. L.	9.75 to 10.00
Steel rails, short, Chicago	9.00 to 9.50
Steel rails, short, Cleveland	11.00 to 11.50
Steel rails, short, St. Louis	9.25 to 9.50
Iron rails, Cleveland nom.	11.00 to 11.00
Iron rails, Chgo	11.00 to 11.25
Iron rails, Cininnati	10.25 to 10.75
Iron rails, eastern Pa.	13.50 to 14.00
Iron rails, St. Louis	10.25 to 10.50
Iron rails, Pittsburgh	13.00 to 13.50
Frogs, switches, guards, Chgo	8.50 to 8.75
Frogs, switches & g'rds, St. L.	9.25 to 9.50
Car wheels, (iron), Pittsburgh	10.50 to 11.00
Car wheels, (steel), Pittsburgh	11.50 to 12.50
Car wheels, Chicago	10.00 to 10.25
Car wheels, eastern Pa.	9.50 to 10.00
Car wheels, Buffalo	10.50 to 11.00
Car wheels, (N. J. points)	9.25 to 9.50
Car wheels, St. Louis	10.25 to 10.50
Iron axles, Pittsburgh	18.00 to 19.00
Iron axles, Cincinnati	19.00 to 20.00
Iron axles, eastern Pa.	18.50 to 19.00
Iron axles, Buffalo	19.00 to 19.50
Iron axles, Chicago	15.50 to 16.00
Steel car axles, New York	11.00 to 11.50
Steel car axles, Buffalo	12.00 to 12.50
Steel car axles, Cleveland	12.00 to 12.50
Steel car axles, eastern Pa.	13.00 to 13.50
No. 1 busheling, Buffalo	8.25 to 8.75
No. 1 busheling, Pittsburgh	8.50 to 8.75
No. 2 busheling, Buffalo	5.75 to 6.25
Low phosphorus steel, Buffalo	14.00 to 14.50
Low phosphorus steel, Pbgh	12.75 to 13.25
Low phos. steel, eastern Pa.	13.50 to 14.00
No. 1 forge, eastern Pa.	7.50 to 8.00
No. 1 cast, eastern Pa.	11.50 to 12.00
No. 1 cast, Pittsburgh	10.75 to 11.00
No. 1 heavy cast (N. J. points)	10.25 to 10.50
Mall. iron, agricul., Cleveland	9.00 to 9.50
Mall iron R. R., Cleveland	9.00 to 9.25
Malleable, railroad, Pittsburgh	9.75 to 10.00
Mall., R. R., Buffalo	9.75 to 9.75
Mall. R. R., east. Pa.	8.00 to 8.50
Bundled sheet, Pittsburgh	8.00 to 8.50
Bundled sheet, Cleveland	7.50



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Electric Steel—II

(*Continued from page* 1130)

the higher tensile strength gives a higher working strength to electric steel.

Higher temperature can be obtained at reasonable costs, with the electric furnace than with the fuel steel furnaces. These higher temperatures are probably the ultimate cause of much of the higher quality of electric steel. The hotter slags separate more complete from the metal and at the higher temperature the desired chemical reactions are carried further toward completion in the time available for the heat.

Electric furnace slags are the same general types as open-hearth slags. Owing to the higher temperatures both more basic and more acid slags can be made commercially than in fuel furnaces. When refining, the higher temperature also makes the slag more active chemically, so that smaller amounts are required or more refining can be done in the electric furnace with the same amount of flux as used in an open-hearth.

When properly operated, electric furnace slags can readily be made to carry less than 1 per cent of the weight of the metal poured. This slag loss represents practically all of the metal loss. In well operated furnaces it is not unusual to have the metal loss less than ½ per cent for monthly averages.

Cost

When first introduced, electric steel was made at a high cost. The use of the electric furnace was then justified by the high quality of the product. Gradually the furnaces have become more efficient and simpler. Less labor is required and lower priced labor. Even from the first, when the furnaces were experimental and had to be persuaded to work at all, the cost of electric steel was said to be lower than crucible steel for the same tonnage output.

As improved types of furnaces came into service the cost was lowered and several years ago it became evident that in the United States electric steel could be made on a competitive basis with the side blow converter. In the last two years still more efficient forms of electric steel furnaces have been put into commercial service and it is now evident, that for equal tonnage output, electric steel can be made under certain conditions as cheap as open-hearth steel.

Electric steel furnaces have been built in sizes that compare in output with the larger commercial sized open-hearth furnaces and there is no evident reason why the output of the largest open-hearths now in use cannot be reliably exceeded with electric units.

The low operating cost of the electric steel furnace and its low investment cost, together with the high quality of the product, render probable in the next decade a change to electric steel-making, similar to the change of the last decade from the Bessemer converter to the open-hearth.

Apprentice Work in Steel Plants

(*Continued from page* 1138)

connections and operation, with the "Safety First" idea always in view. A wrong motor connection may sometimes result in serious injury to the apprentice and damage to the equipment.

The classes should be small so that the instructor can keep a more careful watch on the progress of each apprentice. The class room instruction should be based on a common school education, and should include arithmetic, some algebra, together with mechanical drawing

and shop practice. The mathematics should teach simple shop problems. The main object of the mechanical drawing is to give the student simple instruction in sketching free hand from different objects and parts of machines and then make working drawings from these sketches. These instructions should enable the apprentice to read any shop drawing and to sketch parts of any machine.

Boys, to be eligible to this apprenticeship course, must be of such age as will not conflict with the laws of the state in which the plant where they are employed is located. When an applicant has been accepted for the course, he must serve a probation period of three months at the regular rate of compensation. Those who prove, during this period, that they possess natural ability for the chosen work and satisfy the company as to their general character, should be permitted to sign the regular apprenticeship agreement and they should be allowed to continue and complete the apprenticeship course, providing they give satisfactory service in the practical as well as the class room work.

The apprentice should be required to spend six hours each week in class room instruction, and these instructions should preferably be held on Tuesday, Thursday and Saturday from 9:00 to 11:00 a. m. If an apprentice fails to attend classes the time should be deducted from his pay.

The duration of such apprenticeship should be three years and during the first year the apprentice shall be known as of the third grade; during the second year as of the second grade; and during the third year as of the first grade, provided, however, that the company may at any time at its discretion allow the apprentice credits advancing him in his grade for previous experience, completion of a course of instruction in some established school approved by the company, or meritorious progress during his period as apprentice. The company should also reserve the right, at its discretion, to discipline the apprentice for unsatisfactory service or infraction of any rules by increasing the required time in any grade beyond that specified above.

In plants where piece work is done, the bonus system could be very profitably employed in the training of apprentices. In addition to the regular guaranteed wage, which should increase with the length of service, the apprentice should be paid for time saved from a fixed standard. This would necessitate the fixing of a standard time in which a given operation should be accomplished. In working under a bonus system the apprentice is given an educational advantage of very great importance. He learns that by greater efficiency of production a bonus can be earned and naturally he becomes a student of those problems, the solution of which means money gained by the workmen, as well as the company. In addition to being taught how to operate machinery he is taught how to strive for the greatest possible results in quantity of production that can be achieved without lowering the standard of the product. He finally acquires the power to estimate the time required for a given piece of work, and also the knowledge of what costs actually are.

At the end of the each year's course the apprentice should be required to take an examination to determine just how much he has retained from the year's instruction in those particular grades.

A steel mill apprenticeship course as outlined above will give an excellent opportunity for obtaining such experience, and will afford the apprentice a chance for acquiring an intimate knowledge of many of the fundamentals in both the electrical and mechanical work, which will give him a firm basis for the future.

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Minimum, 50 words, $1.00. Each additional word, 2c. All capitals, 50 words, $1.50. Each additional word, 3c.

Position Wanted
Minimum, 25 words, 50c. Each additional word, 2c. All capitals, 25 words, 75c. Each additional word, 3c.

Miscellaneous Classified
Minimum, 25 words, $1.00. Each additional word, 4c. All capitals, 25 words, $2.00. Each additional word, 8c.

Men Wanted

UNDERSIGNED COUNSEL WILL CONfidentially negotiate preliminaries for important executive, technical, administrative and professional positions, insuring strictest privacy. Not an agency, but a highly-endorsed, high grade method of negotiating preliminaries only, for $3,000 to $12,000 men. Send address only for explanation. R. W. Bixby, Lock Box 134-E9, Buffalo, N. Y.

WANTED: AN EXPERIENCED MANaging foreman to take charge of a modern, up-to-date machine foundry. Experience in molding and casting boilers required. Permanent to right party. Send references and full qualifications. Economy Boiler Co., Willmar, Minn.

WANTED:—AN EXPERIENCED BLAST furnace SUPERINTENDENT, used to making high grade foundry irons, at an up-to-date Pennsylvania plant. Reply, giving copies of references and other particulars, to Box 291, THE IRON TRADE REVIEW, Cleveland.

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POSITION AS GRAY IRON FOUNDRY foreman; experienced on molding machines, match plates, cupola practice and handling men; willing to start for reasonable salary to show my ability; references. Address Box 300, THE IRON TRADE REVIEW, Cleveland, O.

SKELP ROLLER, 17 YEARS' EXPErience; first class mechanic; careful worker; best references; inventive ability; also knows proper drafting of rolls; desires position with good firm. Correspondence solicited. Address Box 298, THE IRON TRADE REVIEW, Cleveland, O.

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